Total Maximum Daily Load

Evaluation

for

Thirty-One Stream Segments

in the

Chattahoochee River Basin

For Sediment

(Biota Impacted)

Submitted to:

The U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

Submitted by:
The Georgia Department of Natural Resources
Environmental Protection Division
Atlanta, Georgia

January 2003

Table of Contents

List of Tables

List of Figures

Appendix

EXECUTIVE SUMMARY

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into three categories, supporting, partially supporting, or not supporting their designated uses, depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* every two years.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and to restore and maintain water quality.

The State of Georgia has identified thirty-one (31) stream segments located in the Chattahoochee River Basin as water quality limited (i.e. 303(d) listed as Biota Impacted) due to sedimentation. The water use classification of all of the impacted streams is Fishing. The general water quality criteria not being met states:

> All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

The Biota Impacted designation indicates that studies have shown a modification of the biological community, more specifically, fish. In 1990, 1998, 1999, and 2000 the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations. WRD used the Index of Biotic Integrity (IBI) and modified Index of Well-Being (IWB) to identify affected fish populations. The IBI and IWB values were used to classify the population as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as Poor or Very Poor were included in the partially supporting list. As a result, thirty-one stream segments in the Chattahoochee River Basin were added to the State's 303(d) list and scheduled for a TMDL evaluation. Forty-two stream segments, assessed and rated as Excellent, Good, and/or Fair, were considered as supporting uses.

The general cause of low IBI scores is the lack of fish habitat due to stream sedimentation. To determine the relationship between the in-stream water quality and the source loadings, each watershed was modeled. The analysis performed to develop sediment TMDLs for the 303(d) listed watersheds utilized the Universal Soil Loss Equation (USLE). The USLE predicts the average annual soil loss caused by erosion. The USLE method considered the characteristics of the watershed including land use, soil type, ground slope, and road surface. National Pollutant Discharge Elimination System (NPDES) permitted discharges were also considered. Modeling assumptions were considered conservative and provide the necessary implicit margin of safety for the TMDL.

The USLE was applied to both the 303(d) listed watersheds and those not biologically impacted to determine both the existing sediment loading rates and the sediment load reductions needed

to support beneficial use (i.e., unimpacted conditions). The average sediment loads in the 303(d) listed watersheds in the Piedmont and Southeastern Plains ecoregions are 0.74 tons/acre/yr (ranging from 0.10 to 2.30 tons/acre/yr), and 0.63 tons/acre/yr (ranging from 0.07 to 1.69 tons/acre/yr), respectively. The average sediment loads of the watersheds in the Piedmont and Southeastern Plains ecoregions not on the 303(d) list are 0.77 tons/acre/yr (ranging from 0.01 to 3.33 tons/acre/yr) and 0.88 tons/acre/yr (ranging from 0.04 to 1.84 tons/acre/yr), respectively. These values represent sediment load contributions from all land uses within unimpaired watersheds. Note that the average annual sediment loads for both watershed groups are generally within the same range.

Table 1 shows that approximately 88.17 percent of the average sediment load in the Chattahoochee River Basin watersheds modeled results from row crops with an average sediment load of 8.40 tons/acre/yr. Approximately 0.78 percent of the total sediment load is from pastureland with an average load of 0.13 tons/acre/yr. In the modeled Chattahoochee River Basin watersheds, mining activities contribute approximately 2.34 percent of the total sediment load with an average load of 62.32 tons/acre/yr. Roads contribute approximately 4.95 percent of the total sediment load, forests make up about 0.80 percent of the total load with an average load of 0.01 tons/acre/year, and urban land contributes approximately 0.84 percent of the total sediment load with an average load of 0.43 tons/acre/yr. Estimates of the sediment contribution from construction are not available, but could represent a relatively high sediment load per acre.

Table 1. Summary of Current Conditions in the Chattahoochee River Basin

Land Use	Average Percent Land Use	Average Percent Sediment Load	Average Sediment Load (tons/acre/yr)
Open Water	0.51%	0.00%	0.00
Urban	1.95%	0.84%	0.43
Bare Rock, Sand and Clay	0.00%	0.00%	0.00
Quarries, Strip Mines, Gravel Pits	0.04%	2.34%	62.32
Transitional Land	5.12%	0.44%	0.09
Forest	70.98%	0.80%	0.01
Pasture/Hay	6.09%	0.78%	0.13
Row Crops	10.50%	88.17%	8.40
Grasses, Wetland	4.82%	1.68%	0.35
Roads		4.95%	

These data indicate that row crops are the major source of sediment to our rivers and streams. However, over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. Since 1950, there has been a 57 percent reduction in farmland. With the reduction in farmland, there has also been a decrease in the amount of soil erosion. This suggests that the sedimentation observed in the impaired stream segments may be legacy sediment resulting from past land use practices. It is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

This TMDL determines the allowable sediment loads to the impaired Chattahoochee River Basin streams and is based on the hypothesis that an impaired watershed having an annual average sediment loading rate similar to the biological reference watersheds will remain stable and not be biologically impaired due to sediment. The average sediment loads of the reference watersheds in the Piedmont and Southeastern Plains ecoregions within the Chattahoochee and Flint River basins are 0.63 tons/acre/yr (ranging from 0.30 to 1.26 tons/acre/yr) and 1.10 tons/acre/yr (ranging from 0.28 to 1.84 tons/acre/yr), respectively. The annual average sediment loads for each of the impaired watersheds are summarized in the table below with any required sediment load reductions.

Management practices that may be used to help reduce and/or maintain the average annual sediment loads include:

- Compliance with the requirements of the NPDES permit program
- Implementation of Georgia Forestry Commission (GFC) Best Management Practices for forestry
- Adoption of Natural Resources Conservation Service (NRCS) Conservation Practices
- Adherence to the Mined Land Use Plan prepared as part of the Surface Mining Permit Application
- Adoption of proper unpaved road maintenance practices
- Implementation of Erosion and Sedimentation Control Plans for land disturbing activities
- Mitigation and prevention of stream bank erosion due to increased streamflow velocities caused by urban runoff

The amount of sediment delivered to a stream is difficult to determine. However, by requiring and monitoring the implementation of these practices, their effects will improve stream habitats and water quality, and represent a beneficial measure of TMDL implementation.

Annual Average Sediment Loads and the Required Sediment Load Reductions

Name	Current Load (tons/yr)	WLA (tons/yr)	LA (tons/yr)	Total Load (tons/yr)	% Reduction
Anneewakee Creek	5,121	148.4	4972	5,121	0%
Cavender Creek	490		454	454	7%
Flat Shoals Trib.	781		590	590	25%
Hilly Mill Creek	5,548		4,758	4,758	14%
Long Branch	583		463	463	21%
Long Cane Creek	37,628	92.8	31361	31,454	16%
Mineral Springs Branch upper	469		469	469	0%
Mineral Springs Branch down	816	54.9	718	773	5%
Mt. Hope Branch	126		126	126	0%
Ollie Branch	200		200	200	0%
Piney Woods Creek	593		593	593	0%
Shoal Creek	602		602	602	0%
Snake Creek	334		334	334	0%
Town Creek	1,615		1,345	1,345	17%
Wahoo Creek	7,880	137.0	7743	7,880	0%
Black Creek	3,797		3,797	3,797	0%
Bustahatchee Creek	1,291		1,291	1,291	0%
Coheelee Creek	17,963		14,358	14,358	20%
Day Creek	4,138		4,138	4,138	0%
Hitchitee Creek	5,172		5,172	5,172	0%
Hodchodkee Creek upper	9,415	27.4	9388	9,415	0%
Hodchodkee Creek lower	35,516	27.4	35488	35,516	0%
Hog Creek	5,548	1.4	5547	5,548	0%
Little Hitchitee Creek	555		555	555	0%
Little Juniper Creek	1,486		1,486	1,486	0%
Little Pine Knot Creek	272		272	272	0%
Pataula Creek	5,982		5,482	5,482	8%
Pine Knot Creek	6,945		6,945	6,945	0%
Roaring Branch	8,591		5,578	5,578	35%
Tiger Creek	625		625	625	0%
Weaver Creek	2,801		2,801	2,801	0%

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into three categories, supporting, partially supporting, or not supporting their designated uses depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that addresses the assessment process, and are published in *Water Quality in Georgia* every two years.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and to restore and maintain water quality.

In 1990, 1998, 1999, and 2000, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations at a number of monitoring sites in the Chattahoochee River Basin. WRD used the Index of Biotic Integrity (IBI) and modified Index of Well-Being (IWB) to identify affected fish populations. The IBI and IWB values were used to classify the populations as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as Poor or Very Poor were listed as Biota Impacted. The Biota Impacted designation indicates that studies have shown a significant modification of the biological community. Thirty-one stream segments (see Table 2) were rated as Poor or Very Poor, placed on the 303(d) list as partially supporting their designated water use, and scheduled for TMDL evaluation. Forty-two stream segments were rated as Excellent, Good, or Fair and assessed as supporting their designated water use.

1.2 Watershed Description

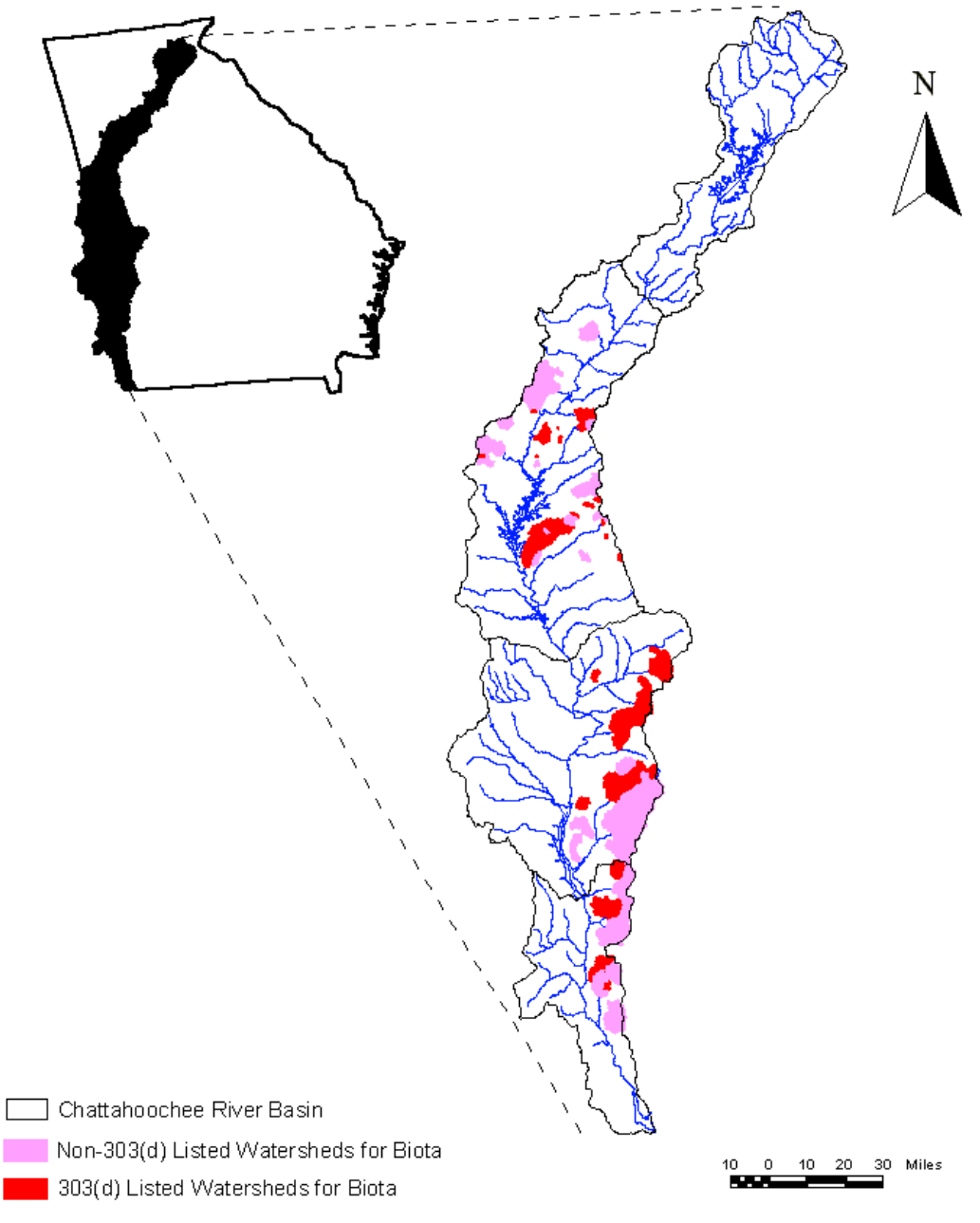
The thirty-one impaired stream segments (made up of forty-four watersheds) are located in the Chattahoochee River Basin in middle and southwest Georgia. These watersheds incorporate the following counties: Chattahoochee, Clay, Coweta, Douglas, Early, Heard, Marion, Meriwether, Muscogee, Quitman, Randolph, Stewart, and Troup (see Figure 1). The forty-two unimpaired watersheds are located in Chattahoochee, Clay, Coweta, Douglas, Early, Harris, Heard, Marion, Meriwether, Muscogee, Quitman, Randolph, Stewart, and Troup Counties.

The land use characteristics of the Chattahoochee River Basin watersheds were determined using data from Georgia's Multiple Resolution Land Coverage (MRLC). This coverage is based on Landsat Thematic Mapper digital images developed in 1995. The classification is based on a modified Anderson level one and two system. Table 3 lists the land use distribution of the eighty-six watersheds WRD monitored in 1998 through 2000. The watersheds are grouped by those that are not on the 303(d) list and those that are on the 303(d) list, as well as by ecoregion (Piedmont and Southeastern Plain). Any impaired upstream watersheds that contribute to an impaired listed downstream watershed are shaded gray. Table 4 lists the landuse

Table 2. 303(d) Listed Stream Segments located in the Chattahoochee River Basin

STREAM	STATUS	LOCATION	MILES
Anneewakee Creek	Partially Supporting	House Creek to Lake Monroe	3
Black Creek	Partially Supporting	Headwaters to Hannahatchee Creek (Stewart Co)	6
Bustahatchee Creek	Partially Supporting	Confluence with North Fork to Lake Walter F. George (Quitman Co)	1
Cavender Creek	Partially Supporting	Carroll County	2
Coheelee Creek	Partially Supporting	Chancy Mill Creek to Chattahoochee River (Early Co)	5
Day Creek	Partially Supporting	Bluff Springs Branch to Hodchodkee Ck (Stewart Co)	1
Hilly Mill Creek	Partially Supporting	Heard/Coweta Co	6
Hitchitee Creek	Partially Supporting	Cany Ck to Sand Branch (Chattahoochee/Stewart Co)	5
Hodchodkee Creek	Partially Supporting	SR 27 to Wimberly Mill Branch (Stewart Co)	3
Hodchodkee Creek	Partially Supporting	Day Creek To Foreman Mill Branch (Stewart Co)	5
Hog Creek	Partially Supporting	Headwaters to Cemochechobee Creek (Randolph/Clay Co)	9
Little Hitchitee Creek	Partially Supporting	Headwaters to Hitchitee Creek (Chattahoochee Co)	6
Little Juniper Creek	Partially Supporting	Headwaters to Kings Mill Pond (Marion/Chattahoochee Co)	7
Little Pine Knot Creek	Partially Supporting	Headwaters to Pine Knot Creek (Chattahoochee Co)	4
Long Branch	Partially Supporting	Coweta County	4
Long Cane Creek	Not Supporting	Panther, Blue John and Long Cane Creeks d/s LaGrange to Chattahoochee River (Troup Co)	14
Mineral Springs Branch	Partially Supporting	Newnan upstream from Bonnell (Coweta Co)	1
Mineral Springs Branch	Partially Supporting	Newnan downstream from Bonnell (Coweta Co)	3
Mt. Hope Branch	Partially Supporting	Meriwether County	4
Ollie Creek	Partially Supporting	Meriwether County	1
Pataula Creek	Partially Supporting	Headwaters to Clear Creek (Stewart Co)	9
Pine Knot Creek	Partially Supporting	Parkers Mill Creek to Little Pine Knot Creek (Marion/Chattahoochee Co)	6
Piney Woods Branch	Partially Supporting	Headwaters to Tom Keith Rd (Meriwether Co)	2
Roaring Branch	Partially Supporting	Headwaters to Chattahoochee River (Clay Co)	7
Shoal Creek	Partially Supporting	Headwaters (Mountville) to I-85/Ga Hwy 403 (Troup Co)	3
Snake Creek	Partially Supporting	Coweta County	4
Tiger Creek	Partially Supporting	Headwaters to Upatoi Creek, Columbus (Muscogee Co)	5
Town Creek	Partially Supporting	Headwaters to Little Creek (Heard Co)	6
Trib to Flat Shoal Creek	Partially Supporting	Headwaters to Flat Shoal Creek (Meriwether Co)	2
Wahoo Creek	Partially Supporting	Upstream Arnco Mills Lake (Coweta Co)	7
Weaver Creek	Partially Supporting	Headwaters to Sawhatchee Creek (Early Co)	5

Source: GAEPD, 1998-1999. *Water Quality in Georgia, 1998-1999,* Georgia Department of Natural Resource, Environmental Protection Division.



TMDL Evaluation - Biota Chattahoochee River Basin	Figure 1. Non-303(d) Listed and 303(d) Listed Waterhseds Monitored in the Chattahoochee River Basin for Biota

percentages for all the Chattahoochee River Basin watersheds monitored. The data show that the watersheds are predominately forested with approximately 69.32 percent (ranging from 0 to 99.33 percent) in forest use. Agriculture is the next predominate land use with approximately 6.85 percent cropland (ranging from 0.04 – 46.62 percent) and approximately 7.67 percent pastureland (ranging from 0. to 34.02 percent).

The soil characteristics of the Chattahoochee River Basin watersheds were determined using data from the State Soil Geographic (STATSGO) coverage. This coverage provides major soil type classifications. Table 5 lists the soil type distribution of the monitored watersheds.

1.3 Water Quality Standard

The water use classification for the impaired watersheds in the Chattahoochee River Basin is Fishing. The criterion violated is listed as Biota Impacted, which indicates studies have shown a significant impact to fish. The potential cause(s) listed include urban runoff, nonpoint sources, unknown sources, and industrial facilities. The purpose of the narrative standard is to prevent objectionable conditions that interfere with legitimate water uses, as stated in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03(5)(c):

> All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

Table 3. Land Use Distribution (Unimpaired – Piedmont Ecoregion)

	Area (acres)															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Anneewakee Creek upper	53.60	1897.18	496.59	667.38	0.22	58.27	38.25	2779.17	1230.69	1693.25	243.96	337.81	347.37			9843.74
Anneewakee Creek lower	58.71	2004.60	504.15	712.53	0.22	58.27	38.25	3193.48	1409.93	1910.08	288.44	380.50	347.59			10906.75
Beech Creek	2.45			1.78			121.65	507.04	737.66	464.12	31.58	21.57		94.74		1982.58
Big Branch	9.56	6.89		10.23			57.82	509.71	1020.31	530.84	255.97	155.45		121.20	1.78	2679.76
Blue John Creek middle	9.79	970.94	194.81	333.80				507.93	668.94	779.91	311.56	297.33	316.68	0.22		4391.92
Copeland Creek	3.34			1.11				351.37	222.39	271.98	377.84	74.05				1302.08
lat Creek	45.14	7.78		76.72			1045.66	3751.00	4327.21	3063.16	1688.58	520.83	2.22	1102.82	65.38	15696.52
Flat Shoals Creek								173.68	233.73	183.25	3.78	0.22				594.66
Fromby Creek	4.67			0.22				110.75	567.98	270.87	18.01	3.11		18.01	1.11	994.74
Gum Branch	0.89			1.11				394.74	40.47	92.07	244.40	99.85				873.54
Gum Creek	8.01			5.56				1857.60	654.93	964.71	981.84	359.38	0.22			4832.25
Hillabatchee Creek	3.56	0.67		5.56			7.78	7365.90	3027.35	2885.03	508.38	354.71				14158.93
Little Snake Creek	1.78	0.89		0.89			11.56	895.11	419.87	664.05	113.64	41.36	0.89			2150.04
Long Cane Creek up U/S	12.68			2.22			42.03	1005.19	756.56	1070.57	409.64	151.67		25.13		3475.69
Long Cane Creek up D/S	15.12			4.00			42.03	1035.43	800.37	1099.48	426.32	156.78		26.91		3606.45
Norman Creek	0.67	2.00		1.33				520.61	508.60	440.99	287.10	94.29	0.22	0.22		1856.04
Panther Creek upper	2.67						10.45	207.04	382.28	341.59	83.62	13.34		4.67		1045.66
Polecat Creek	31.36	4.89	1.56	11.12				360.49	492.14	473.68	916.01	363.16	8.90	28.24	0.67	2692.22
Red Oak Creek	2.22			1.78			7.78	1742.18	695.18	746.55	170.35	174.13				3540.18
Snake Creek upper	50.04	40.92	4.23	24.91			97.41	1291.62	1337.44	1017.64	500.59	246.63	5.56			4616.98
Snake Creek lower	97.63	79.39	5.56	50.48			1269.38	9022.68	6710.53	5393.33	1934.10	922.02	30.24	1.33		25516.68
Town Creek lower	4.67			9.12			542.62	2396.00	1527.58	1167.98	257.75	167.68	5.78			6079.17
Trib to Whooping	1.78							133.21	112.31	120.53	75.83	15.79				459.45
Whooping Creek upper	60.93	14.90	0.22	16.68				1028.76	644.26	715.64	500.59	219.94	3.11	17.79		3222.83
Whooping Creek lower	75.17	25.13	0.44	36.25			33.36	5420.01	3464.34	3762.79	2688.88	1042.33	17.12	17.79		16583.62
Wolf Creek	15.12	0.22		3.56				493.03	346.92	369.16	404.30	38.03				1670.35

Table 3. Land Use Distribution (Unimpaired – Southeastern Plains Ecoregion)

	Area (acres)																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Cemochechbee Creek	22.91	1.56		10.23			583.99	4258.71	3720.31	3958.04	496.81	2489.18	2.89	315.12	18.90	15878.65
Colochee/Frog Bottom Ck	14.01	0.67		1.56			358.04	3760.34	2024.39	2471.39	65.83	90.96		124.98		8912.16
Drag Nasty Creek	26.24			2.67			812.38	1589.84	1227.13	1706.38	850.19	1563.83		379.84	10.01	8168.50
Flat Creek	53.15	1.56		8.23	0.22		1057.89	3481.69	2113.12	2979.76	1859.60	4922.76	4.00	409.19	2.22	16893.40
Holanna Creek	19.13	29.13	1.33	18.24			1990.81	5065.31	7471.31	5905.49	360.93	1542.70	7.56	1565.16	32.47	24009.56
Kirkland Creek	92.07			12.90			539.96	2628.84	1392.14	2034.17	3677.84	10604.97		1667.24	99.41	22749.52
Kolomoki Creek	269.53	5.78	3.34	22.24			1855.37	5482.06	5194.96	5426.46	4289.62	12955.37	5.11	1208.01	151.45	36869.31
Ochillee Creek	31.36	9.56	2.00	23.35			725.65	5607.04	3341.59	4508.67	42.03		15.34	704.30	13.57	15024.46
Pataula Creek	369.16	14.90	1.11	54.93			6353.15	21320.01	26487.18	22538.70	2422.46	7041.88	17.35	6628.02	57.38	93306.23
Pumpkin Creek	14.46	0.67		4.00			1475.09	4241.36	6125.43	5292.14	178.35	583.32		550.41	6.45	18471.68
Sawhatchee Creek	60.49	1.78		8.67			475.02	2081.10	680.73	1356.78	1666.57	2855.00	1.11	983.40	118.53	10289.18
Sawhatchee Creek	108.75	2.45		23.57			987.62	4276.95	3089.84	3619.13	2681.76	6206.82	1.11	2951.96	161.01	24110.97
Smithee Jack Creek	3.56	0.44		1.78			478.58	938.47	2593.03	1911.86	289.99	433.65		306.67	2.22	6960.27
Tobannee Creek	7.12	0.22		1.11			143.22	520.61	1347.66	1106.38	329.36	211.05	0.22	205.49		3872.42

Table 3. Land Use Distribution (Impaired – Piedmont Ecoregion)

	Area (acres)																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Anneewakee Creek	54.04	1910.08	496.59	694.29	0.22	58.27	38.25	2954.41	1311.19	1787.32	252.19	348.04	347.37			10252.26
Blue John Creek upper	6.45	970.50	194.81	302.22				398.07	597.33	664.94	279.76	228.84	316.68	0.22		3959.82
Blue John Creek lower	16.01	1298.30	223.72	471.02			0.44	699.18	864.86	1054.11	337.81	360.71	449.67	0.22		5776.06
Cavender Creek								161.90	272.42	155.89	106.08	24.24				720.53
Flat Shoals Trib.	1.33			1.11				225.28	268.20	228.84	181.47	30.02				936.25
Hilly Mill Creek upper	7.12	0.89		2.00				1357.89	726.54	976.95	241.73	190.81				3503.93
Hilly Mill Creek	24.46	1.33		5.78				2124.02	2348.63	2007.04	549.30	428.98		62.27		7551.82
Long Branch	15.34			1.11				187.92	249.07	159.90	74.50	29.36		18.01	0.22	735.43
Long Cane Creek midupper	147.00	70.50	6.89	219.27		105.86	94.51	4203.78	3764.34	4140.40	1708.38	839.07	64.05	449.89	9.79	15823.72
Long Cane Creek midup	178.35	72.72	6.89	245.29		105.86	94.51	5138.25	4836.47	5308.60	2118.68	1091.48	85.40	735.21	13.57	20031.28
Long Cane Creek middle	234.17	1639.44	269.98	1122.61		144.33	161.01	8003.93	7962.79	8647.96	2987.10	1726.39	961.60	1257.82	14.23	35133.36
Long Cane Creek midlow	264.64	1652.11	270.87	1163.75		144.33	323.80	9488.14	9379.84	9918.90	3500.37	1986.36	972.94	1755.52	24.24	40845.81
Long Cane Creek midlower	321.13	1673.46	271.98	1226.24		144.33	354.71	11133.14	11186.29	11798.30	4381.47	2268.35	973.39	2474.94	90.51	48298.22
Long Cane Creek	349.37	1706.15	272.87	1249.37		144.33	354.71	11442.70	11663.75	12300.67	4459.75	2279.69	983.84	2616.38	103.41	49926.98
Mineral Springs Branch up	0.67	273.09	41.59	19.79				99.18	62.27	149.89	30.69	8.45	66.94			752.56
Mineral Springs Branch down	4.45	377.61	62.05	75.17				160.34	137.21	259.75	43.14	14.90	92.51			1227.13
Mt. Hope Branch	2.00			0.22				498.81	46.26	83.17	1.11	9.12				640.70
Ollie Branch	4.67			1.33			5.56	365.16	489.92	316.68	54.71	24.02		38.47	5.78	1306.30
Panther Creek middle	24.02	14.90	0.44	2.45		97.41	16.46	796.59	702.97	708.75	362.94	114.97	6.23	43.81		2891.92
Panther Creek lower	31.58	14.90	0.44	28.47		97.41	21.35	1421.94	1203.78	1149.52	538.40	267.09	6.23	57.38		4838.47
Piney Woods Creek	3.56			1.78			6.89	209.04	631.80	240.18	257.30	66.94		16.01		1433.51
Shoal Creek	4.00	2.67	0.22	1.78				438.10	250.85	311.12	265.31	53.37	0.44	1.56		1329.43
Snake Creek upper	0.44	249.30	35.36	131.65			0.67	118.75	146.78	163.68	0.22		86.29			933.14
Snake Creek	1.11	254.86	37.81	157.23			0.67	149.00	205.04	197.03	1.11		93.85			1097.70
Town Creek	2.45			1.33			14.46	1002.08	444.55	468.12	135.21	67.38				2135.58
Wahoo Creek upper	10.90	510.60	101.19	293.55			0.44	505.49	425.65	549.74	6.45	14.46	138.99			2557.45
Wahoo Creek middle	66.05	640.70	123.20	474.13			1.11	866.42	1139.51	1083.25	106.52	75.39	213.71	16.01		4806.00
Wahoo Creek	129.65	1123.28	166.12	713.42			4.23	2486.06	3003.56	2911.49	831.73	410.08	423.20	529.50	8.67	12740.99

Table 3. Land Use Distribution (Impaired – Southeastern Plains Ecoregion)

Area (acres)																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Black Creek	22.91	2.89		7.34			414.31	3696.74	2396.89	2469.83	47.81	330.47	1.56	423.65	4.67	9819.05
Bustahatchee Creek	4.23						184.58	929.36	2001.48	1917.87	43.81	34.03		34.69	30.69	5180.73
Coheelee Creek	49.37	0.67		13.34			426.09	1616.31	1770.64	2203.19	1097.70	4510.67		1290.51	74.50	13053.00
Day Creek	8.67	0.22		3.34			1014.53	1570.27	3952.48	2629.95	152.11	516.60		473.02	7.78	10328.98
Hitchitee Creek	72.50	106.08	37.81	247.07			1443.96	10900.96	4416.16	6431.88	88.95	386.51	38.47	1020.09	12.68	25203.11
Hodchodkee Creek upper	20.24	36.25	20.01	32.69			749.22	2874.57	1628.09	1638.55	320.46	1287.18	12.01	332.91	18.90	8971.09
Hodchodkee Creek lower	86.95	114.75	52.71	65.60			2769.38	7691.70	12171.24	9313.79	1004.30	4265.60	29.80	1786.88	46.26	39398.96
Hog Creek	5.56	12.45	0.67	6.67			368.27	2716.23	2174.94	3174.57	97.41	631.13	4.23	238.40	3.56	9434.10
Little Hitchitee Creek	2.45	0.67		1.11			52.04	2296.59	807.93	1208.23	30.24	40.70		326.69	8.23	4774.87
Little Juniper Creek	3.56	0.44		0.89			1604.52	1434.40	859.08	1083.91	29.80	279.99		237.06	13.57	5547.22
Little Pine Knot Creek		2.00		15.57			67.38	1504.45	742.11	1157.97	9.56	20.46	4.00	120.76	1.11	3645.37
Pataula Creek	18.46	8.90	1.11	29.36			187.92	1594.29	680.73	879.76	616.01	779.24	13.12	174.57	0.22	4983.69
Pine Knot Creek	50.70	5.34		10.01			4711.71	4258.49	3553.30	3698.30	176.13	1049.89	0.89	126.09		17640.85
Roaring Branch	10.67	0.22		2.22			127.87	861.53	1034.10	1413.71	585.77	903.56		125.43	6.23	5071.31
Tiger Creek	14.68	260.19	67.38	53.37			22.24	555.08	501.71	1061.68	13.57	28.24	20.90	42.92		2641.96
Weaver Creek	11.34	0.22		3.34			153.22	491.25	486.81	401.85	351.59	622.24		213.94	10.23	2746.03

Table 4. Land Use Percentages (Unimpaired – Piedmont Ecoregion)

	Percent Total Land Use														
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Anneewakee Creek upper	0.54%	19.27%	5.04%	6.78%	0.00%	0.59%	0.39%	28.23%	12.50%	17.20%	2.48%	3.43%	3.53%		
Anneewakee Creek lower	0.54%	18.38%	4.62%	6.53%	0.00%	0.53%	0.35%	29.28%	12.93%	17.51%	2.64%	3.49%	3.19%		
Beech Creek	0.12%			0.09%			6.14%	25.57%	37.21%	23.41%	1.59%	1.09%		4.78%	
Big Branch	0.36%	0.26%		0.38%			2.16%	19.02%	38.07%	19.81%	9.55%	5.80%		4.52%	0.07%
Blue John Creek middle	0.22%	22.11%	4.44%	7.60%				11.57%	15.23%	17.76%	7.09%	6.77%	7.21%	0.01%	
Copeland Creek	0.26%			0.09%				26.99%	17.08%	20.89%	29.02%	5.69%			
Flat Creek	0.29%	0.05%		0.49%			6.66%	23.90%	27.57%	19.51%	10.76%	3.32%	0.01%	7.03%	0.42%
Flat Shoals Creek								29.21%	39.30%	30.82%	0.64%	0.04%			
Fromby Creek	0.47%			0.02%				11.13%	57.10%	27.23%	1.81%	0.31%		1.81%	0.11%
Gum Branch	0.10%			0.13%				45.19%	4.63%	10.54%	27.98%	11.43%			
Gum Creek	0.17%			0.12%				38.44%	13.55%	19.96%	20.32%	7.44%	0.00%		
Hillabatchee Creek	0.03%	0.00%		0.04%			0.05%	52.02%	21.38%	20.38%	3.59%	2.51%			
Little Snake Creek	0.08%	0.04%		0.04%			0.54%	41.63%	19.53%	30.89%	5.29%	1.92%	0.04%		
Long Cane Creek up U/S	0.36%			0.06%			1.21%	28.92%	21.77%	30.80%	11.79%	4.36%		0.72%	
Long Cane Creek up D/S	0.42%			0.11%			1.17%	28.71%	22.19%	30.49%	11.82%	4.35%		0.75%	
Norman Creek	0.04%	0.11%		0.07%				28.05%	27.40%	23.76%	15.47%	5.08%	0.01%	0.01%	
Panther Creek upper	0.26%						1.00%	19.80%	36.56%	32.67%	8.00%	1.28%		0.45%	
Polecat Creek	1.16%	0.18%	0.06%	0.41%				13.39%	18.28%	17.59%	34.02%	13.49%	0.33%	1.05%	0.02%
Red Oak Creek	0.06%			0.05%			0.22%	49.21%	19.64%	21.09%	4.81%	4.92%			
Snake Creek upper	1.08%	0.89%	0.09%	0.54%			2.11%	27.98%	28.97%	22.04%	10.84%	5.34%	0.12%		
Snake Creek lower	0.38%	0.31%	0.02%	0.20%			4.97%	35.36%	26.30%	21.14%	7.58%	3.61%	0.12%	0.01%	
Town Creek lower	0.08%			0.15%			8.93%	39.41%	25.13%	19.21%	4.24%	2.76%	0.10%		
Trib to Whooping	0.39%							28.99%	24.44%	26.23%	16.51%	3.44%			
Whooping Creek upper	1.89%	0.46%	0.01%	0.52%				31.92%	19.99%	22.21%	15.53%	6.82%	0.10%	0.55%	
Whooping Creek lower	0.45%	0.15%	0.00%	0.22%			0.20%	32.68%	20.89%	22.69%	16.21%	6.29%	0.10%	0.11%	
Wolf Creek	0.91%	0.01%		0.21%				29.52%	20.77%	22.10%	24.20%	2.28%			

Table 4. Land Use Percentages (Unimpaired – Southeastern Plains Ecoregion)

	Percent Total Land Use														
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Cemochechbee Creek	0.14%	0.01%		0.06%			3.68%	26.82%	23.43%	24.93%	3.13%	15.68%	0.02%	1.98%	0.12%
Colochee/Frog Bottom Ck	0.16%	0.01%		0.02%			4.02%	42.19%	22.71%	27.73%	0.74%	1.02%		1.40%	
Drag Nasty Creek	0.32%			0.03%			9.95%	19.46%	15.02%	20.89%	10.41%	19.14%		4.65%	0.12%
Flat Creek	0.31%	0.01%		0.05%	0.00%		6.26%	20.61%	12.51%	17.64%	11.01%	29.14%	0.02%	2.42%	0.01%
Holanna Creek	0.08%	0.12%	0.01%	0.08%			8.29%	21.10%	31.12%	24.60%	1.50%	6.43%	0.03%	6.52%	0.14%
Kirkland Creek	0.40%			0.06%			2.37%	11.56%	6.12%	8.94%	16.17%	46.62%		7.33%	0.44%
Kolomoki Creek	0.73%	0.02%	0.01%	0.06%			5.03%	14.87%	14.09%	14.72%	11.63%	35.14%	0.01%	3.28%	0.41%
Ochillee Creek	0.21%	0.06%	0.01%	0.16%			4.83%	37.32%	22.24%	30.01%	0.28%		0.10%	4.69%	0.09%
Pataula Creek	0.40%	0.02%	0.00%	0.06%			6.81%	22.85%	28.39%	24.16%	2.60%	7.55%	0.02%	7.10%	0.06%
Pumpkin Creek	0.08%	0.00%		0.02%			7.99%	22.96%	33.16%	28.65%	0.97%	3.16%		2.98%	0.03%
Sawhatchee Creek	0.59%	0.02%		0.08%			4.62%	20.23%	6.62%	13.19%	16.20%	27.75%	0.01%	9.56%	1.15%
Sawhatchee Creek	0.45%	0.01%		0.10%			4.10%	17.74%	12.82%	15.01%	11.12%	25.74%	0.00%	12.24%	0.67%
Smithee Jack Creek	0.05%	0.01%		0.03%			6.88%	13.48%	37.25%	27.47%	4.17%	6.23%		4.41%	0.03%
Tobannee Creek	0.18%	0.01%		0.03%			3.70%	13.44%	34.80%	28.57%	8.51%	5.45%	0.01%	5.31%	

Table 4. Land Use Percentages (Impaired – Piedmont Ecoregion)

	Percent Total Land Use														
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Anneewakee Creek	0.53%	18.63%	4.84%	6.77%	0.00%	0.57%	0.37%	28.82%	12.79%	17.43%	2.46%	3.39%	3.39%		
Blue John Creek upper	0.16%	24.51%	4.92%	7.63%				10.05%	15.08%	16.79%	7.07%	5.78%	8.00%	0.01%	
Blue John Creek lower	0.28%	22.48%	3.87%	8.15%			0.01%	12.10%	14.97%	18.25%	5.85%	6.24%	7.79%	0.00%	
Cavender Creek								22.47%	37.81%	21.64%	14.72%	3.36%			
Flat Shoals Trib.	0.14%			0.12%				24.06%	28.65%	24.44%	19.38%	3.21%			
Hilly Mill Creek upper	0.20%	0.03%		0.06%				38.75%	20.73%	27.88%	6.90%	5.45%			
Hilly Mill Creek	0.32%	0.02%		0.08%				28.13%	31.10%	26.58%	7.27%	5.68%		0.82%	
Long Branch	2.09%			0.15%				25.55%	33.87%	21.74%	10.13%	3.99%		2.45%	0.03%
Long Cane Creek midupper	0.93%	0.45%	0.04%	1.39%		0.67%	0.60%	26.57%	23.79%	26.17%	10.80%	5.30%	0.40%	2.84%	0.06%
Long Cane Creek midup	0.89%	0.36%	0.03%	1.22%		0.53%	0.47%	25.65%	24.14%	26.50%	10.58%	5.45%	0.43%	3.67%	0.07%
Long Cane Creek middle	0.67%	4.67%	0.77%	3.20%		0.41%	0.46%	22.78%	22.66%	24.61%	8.50%	4.91%	2.74%	3.58%	0.04%
Long Cane Creek midlow	0.65%	4.04%	0.66%	2.85%		0.35%	0.79%	23.23%	22.96%	24.28%	8.57%	4.86%	2.38%	4.30%	0.06%
Long Cane Creek midlower	0.66%	3.46%	0.56%	2.54%		0.30%	0.73%	23.05%	23.16%	24.43%	9.07%	4.70%	2.02%	5.12%	0.19%
Long Cane Creek	0.70%	3.42%	0.55%	2.50%		0.29%	0.71%	22.92%	23.36%	24.64%	8.93%	4.57%	1.97%	5.24%	0.21%
Mineral Springs Branch up	0.09%	36.29%	5.53%	2.63%				13.18%	8.27%	19.92%	4.08%	1.12%	8.89%		
Mineral Springs Branch down	0.36%	30.77%	5.06%	6.13%				13.07%	11.18%	21.17%	3.52%	1.21%	7.54%		
Mt. Hope Branch	0.31%			0.03%				77.85%	7.22%	12.98%	0.17%	1.42%			
Ollie Branch	0.36%			0.10%			0.43%	27.95%	37.50%	24.24%	4.19%	1.84%		2.95%	0.44%
Panther Creek middle	0.83%	0.52%	0.02%	0.08%		3.37%	0.57%	27.55%	24.31%	24.51%	12.55%	3.98%	0.22%	1.51%	
Panther Creek lower	0.65%	0.31%	0.01%	0.59%		2.01%	0.44%	29.39%	24.88%	23.76%	11.13%	5.52%	0.13%	1.19%	
Piney Woods Creek	0.25%			0.12%			0.48%	14.58%	44.07%	16.75%	17.95%	4.67%		1.12%	
Shoal Creek	0.30%	0.20%	0.02%	0.13%				32.95%	18.87%	23.40%	19.96%	4.01%	0.03%	0.12%	
Snake Creek upper	0.05%	26.72%	3.79%	14.11%			0.07%	12.73%	15.73%	17.54%	0.02%		9.25%		
Snake Creek	0.10%	23.22%	3.44%	14.32%			0.06%	13.57%	18.68%	17.95%	0.10%		8.55%		
Town Creek	0.11%			0.06%			0.68%	46.92%	20.82%	21.92%	6.33%	3.16%			
Wahoo Creek upper	0.43%	19.97%	3.96%	11.48%			0.02%	19.77%	16.64%	21.50%	0.25%	0.57%	5.43%		
Wahoo Creek middle	1.37%	13.33%	2.56%	9.87%			0.02%	18.03%	23.71%	22.54%	2.22%	1.57%	4.45%	0.33%	
Wahoo Creek	1.02%	8.82%	1.30%	5.60%			0.03%	19.51%	23.57%	22.85%	6.53%	3.22%	3.32%	4.16%	0.07%

Table 4. Land Use Percentages (Impaired – Southeastern Plains Ecoregion)

	Percent Total Land Use														
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Black Creek	0.23%	0.03%		0.07%			4.22%	37.65%	24.41%	25.15%	0.49%	3.37%	0.02%	4.31%	0.05%
Bustahatchee Creek	0.08%						3.56%	17.94%	38.63%	37.02%	0.85%	0.66%		0.67%	0.59%
Coheelee Creek	0.38%	0.01%		0.10%			3.26%	12.38%	13.57%	16.88%	8.41%	34.56%		9.89%	0.57%
Day Creek	0.08%	0.00%		0.03%			9.82%	15.20%	38.27%	25.46%	1.47%	5.00%		4.58%	0.08%
Hitchitee Creek	0.29%	0.42%	0.15%	0.98%			5.73%	43.25%	17.52%	25.52%	0.35%	1.53%	0.15%	4.05%	0.05%
Hodchodkee Creek upper	0.23%	0.40%	0.22%	0.36%			8.35%	32.04%	18.15%	18.26%	3.57%	14.35%	0.13%	3.71%	0.21%
Hodchodkee Creek lower	0.22%	0.29%	0.13%	0.17%			7.03%	19.52%	30.89%	23.64%	2.55%	10.83%	0.08%	4.54%	0.12%
Hog Creek	0.06%	0.13%	0.01%	0.07%			3.90%	28.79%	23.05%	33.65%	1.03%	6.69%	0.04%	2.53%	0.04%
Little Hitchitee Creek	0.05%	0.01%		0.02%			1.09%	48.10%	16.92%	25.30%	0.63%	0.85%		6.84%	0.17%
Little Juniper Creek	0.06%	0.01%		0.02%			28.92%	25.86%	15.49%	19.54%	0.54%	5.05%		4.27%	0.24%
Little Pine Knot Creek		0.05%		0.43%			1.85%	41.27%	20.36%	31.77%	0.26%	0.56%	0.11%	3.31%	0.03%
Pataula Creek	0.37%	0.18%	0.02%	0.59%			3.77%	31.99%	13.66%	17.65%	12.36%	15.64%	0.26%	3.50%	0.00%
Pine Knot Creek	0.29%	0.03%		0.06%			26.71%	24.14%	20.14%	20.96%	1.00%	5.95%	0.01%	0.71%	
Roaring Branch	0.21%	0.00%		0.04%			2.52%	16.99%	20.39%	27.88%	11.55%	17.82%		2.47%	0.12%
Tiger Creek	0.56%	9.85%	2.55%	2.02%			0.84%	21.01%	18.99%	40.19%	0.51%	1.07%	0.79%	1.62%	
Weaver Creek	0.41%	0.01%		0.12%			5.58%	17.89%	17.73%	14.63%	12.80%	22.66%		7.79%	0.37%

Table 5. Soil Type Distribution (Unimpaired – Piedmont Ecoregion)

	Soil Type Area (acres)																				
NAME	GA129	GA108	GA061	GA059	GA053	GA052	GA051	GA050	GA048	GA046	GA042	GA041	GA040	GA039	GA038	GA037	GA034	GA026	GA025	AL085	AL076
K-Factor	**0.14**	**0.27**	**0.18**	**0.25**	**0.18**	**0.13**	**0.12**	**0.15**	**0.28**	**0.16**	**0.13**	**0.17**	**0.14**	**0.13**	**0.15**	**0.27**	**0.25**	**0.25**	**0.27**	**0.27**	**0.27**
Anneewakee Creek upper	8702																		1022		
Anneewakee Creek lower	9768																	63	1022		
Beech Creek																			2004		
Big Branch																			2637		
Blue John Creek middle																			4466		
Copeland Creek		896														425					
Flat Creek																			15435		
Flat Shoals Creek																			625		
Fromby Creek																		663	331		
Gum Branch																		517	376		
Gum Creek																		2154	2623		
Hillabatchee Creek		2451														8056			1027	332	2165
Little Snake Creek																		1132	989		
Long Cane Creek up U/S																			3499		
Long Cane Creek up D/S																			3651		
Norman Creek																		212	1657		
Panther Creek upper																		120	964		
Polecat Creek																			2743		
Red Oak Creek		1407														1289				332	547
Snake Creek upper																		1978	2593		
Snake Creek lower																		14512	10629		
Town Creek lower		1549														1051				1603	1938
Trib to Whooping																		396	80		
Whooping Creek upper																		1039	2132		
Whooping Creek lower																		7988	8343		
Wolf Creek																			1660		

Table 5. Soil Type Distribution (Unimpaired – Southeastern Plains Ecoregion)

Soil Type Area (acres)																					
NAME	GA129	GA108	GA061	GA059	GA053	GA052	GA051	GA050	GA048	GA046	GA042	GA041	GA040	GA039	GA038	GA037	GA034	GA026	GA025	AL085	AL076
K-Factor	**0.14**	**0.27**	**0.18**	**0.25**	**0.18**	**0.13**	**0.12**	**0.15**	**0.28**	**0.16**	**0.13**	**0.17**	**0.14**	**0.13**	**0.15**	**0.27**	**0.25**	**0.25**	**0.27**	**0.27**	**0.27**
Cemochechbee Creek				3242						1856		3317			7327						
Colochee/Frog Bottom Ck							730		6810		905	905			311						
Drag Nasty Creek									4231			3970									
Flat Creek									8		6518	6518			10157						
Holanna Creek				765					15046			7174			525						
Kirkland Creek			2118		1126			19262													
Kolomoki Creek								299		19415		1809			15014						
Ochillee Creek									5510			808	9	4845	3545						
Pataula Creek							1942		50615			28632			10170						
Pumpkin Creek							12		9824			4133			4116						
Sawhatchee Creek			503		498			5985		3389											
Sawhatchee Creek			2718		530	363		15675		5152											
Smithee Jack Creek									4397			2442									
Tobannee Creek									2815			1009									

Table 5. Soil Type Distribution (Impaired – Piedmont Ecoregion)

	Soil Type Area (acres)																				
NAME	GA129	GA108	GA061	GA059	GA053	GA052	GA051	GA050	GA048	GA046	GA042	GA041	GA040	GA039	GA038	GA037	GA034	GA026	GA025	AL085	AL076
K-Factor	**0.14**	**0.27**	**0.18**	**0.25**	**0.18**	**0.13**	**0.12**	**0.15**	**0.28**	**0.16**	**0.13**	**0.17**	**0.14**	**0.13**	**0.15**	**0.27**	**0.25**	**0.25**	**0.27**	**0.27**	**0.27**
Anneewakee Creek	9126																		1022		
Blue John Creek upper																			3978		
Blue John Creek lower																			5953		
Cavender Creek																		221	494		
Flat Shoals Trib.																			945		
Hilly Mill Creek upper																		1671	1838		
Hilly Mill Creek																		2608	4980		
Long Branch																		48	737		
Long Cane Creek midupper																		649	15384		
Long Cane Creek midup																		649	19530		
Long Cane Creek middle																		649	34623		
Long Cane Creek midlow																		649	40258		
Long Cane Creek midlower																		649	47606		
Long Cane Creek																		649	49282		
Mineral Springs Branch up																			800		
Mineral Springs Branch down																			1306		
Mt. Hope Branch																	620		58		
Ollie Branch																			1343		
Panther Creek middle																		123	2880		
Panther Creek lower																		649	4357		
Piney Woods Creek																			1484		
Shoal Creek																			1357		
Snake Creek upper																			949		
Snake Creek																			1121		
Town Creek		526																		1014	595
Wahoo Creek upper																			2617		
Wahoo Creek middle																			4846		
Wahoo Creek																			12746		

Table 5. Soil Type Distribution (Impaired – Southeastern Plains Ecoregion)

	Soil Type Area (acres)																				
NAME	GA129	GA108	GA061	GA059	GA053	GA052	GA051	GA050	GA048	GA046	GA042	GA041	GA040	GA039	GA038	GA037	GA034	GA026	GA025	AL085	AL076
K-Factor	**0.14**	**0.27**	**0.18**	**0.25**	**0.18**	**0.13**	**0.12**	**0.15**	**0.28**	**0.16**	**0.13**	**0.17**	**0.14**	**0.13**	**0.15**	**0.27**	**0.25**	**0.25**	**0.27**	**0.27**	**0.27**
Black Creek							520		6730						2435						
Bustahatchee Creek									4567			532									
Coheelee Creek						2401		5124		5643	6										
Day Creek									6429			2830			910						
Hitchitee Creek									13170			366		7819	3322						
Hodchodkee Creek upper									4092			4809									
Hodchodkee Creek lower									22303			15524			1102						
Hog Creek				362					23			486			8421						
Little Hitchitee Creek									2994					1729							
Little Juniper Creek													1256		4377						
Little Pine Knot Creek									2028						1587						
Pataula Creek									1935			3099									
Pine Knot Creek												858	10410		6026						
Roaring Branch									2678			2370			5						
Tiger Creek									1342					1265							
Weaver Creek			403		32	33		2458		11											

2.0 WATER QUALITY ASSESSMENT

2.1 Fish Sampling

In 1990, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish communities in the Piedmont ecoregion. Biological monitoring is a method used to evaluate the health of a biological system in order to assess degradation from various sources. It is based on direct observations of aquatic communities. The results of these studies were the basis for the original listing of Biota Impacted stream segments on Georgia's 1996 303(d) list. In 1998 and 1999, WRD re-evaluated the stream segments in the Piedmont ecoregion and in 2000, WRD evaluated stream segments in the Southeastern Plains ecoregion.

The work performed by the WRD looked at patterns of fish communities within the various ecoregions. An ecoregion is a region of relative homogeneity in ecological systems or in relationships between organisms and their environment. Seven major ecoregions have been identified in Georgia based upon the soil types, potential natural vegetation, land surface form, and predominant land uses. These include the Blue Ridge Mountains, Ridge and Valley, Southwestern Appalachians, Piedmont, Middle Atlantic Coastal Plain, Southeastern Plains, and Southern Coastal Plain.

Reference sites within the Piedmont and Southeastern Plains ecoregions were established. These sites represented the least impacted sites that exist given the prevalent land use within the ecoregion. Eighty-six sites were sampled within the Chattahoochee River Basin (see Tables 6, 7, and 8). These sites had to be accessible, wadeable, and representative of the stream under investigation. The length of the fish sampling site was thirty-five times the mean stream width up to 500 meters. This sampling length was found to be long enough to include the major habitat types present. Electrofishing and seining techniques were used for sampling the fish population (GAWRD, 2000).

Two indices of fish community health were used to assess the biotic integrity of the aquatic systems: the modified Index of Well-Being (IWB) and the Index of Biotic Integrity (IBI). The IWB and IBI scores were classified as Excellent, Good, Fair, Poor, or Very Poor. Segments with fish populations rated as Poor or Very Poor were listed as Biota Impacted.

The modified IWB measures the health of the aquatic community based on the density and diversity or structural attributes of the fish community. The IWB is calculated based on four parameters: the relative density of fish, the relative biomass of fish, the Shannon-Wiener Index of Diversity based on number, and the Shannon-Wiener Index of Diversity based on biomass.

The IBI assesses the biotic integrity of aquatic communities based on the functional and compositional attributes of the fish community. The IBI consists of twelve measurements or metrics, which assess three facets of the fish population: species richness and composition, trophic composition and dynamics, and fish abundance and condition. Each metric is scored by comparing its value to the value of the regional reference site. Factors that affect the structure and function of a fish community include stream location and size. Thus, the metrics were developed for regional drainage basins, e.g. the Apalachicola drainage basin, which includes the Chattahoochee and Flint River Basins. To account for the fact that streams with larger drainage basins normally have greater species richness, Maximum Species Richness plots were developed for the species richness metric (GAWRD, 2000).
To supplement the findings of the fish community data, habitat assessments were performed at each sampling site. Habitat scores evaluate the physical surroundings of a stream as they affect

and influence the quality of the water resource and its resident aquatic community. These data may also help clarify the results of the biotic indices. The habitat assessment used was developed by personnel with the Water Protection Branch (WPB) of the Georgia Environmental Protection Division and is a modification of the EPA Rapid Bioassessment Protocol III (GAWPB, 2000). It incorporates different assessment parameters for riffle/run and glide/pool prevalent streams.

The habitat assessment evaluates the stream's physical parameters and is broken into three levels. Level one describes in-stream characteristics that directly affect biological communities (in-stream cover, epifaunal substrate, embeddedness, and riffle frequency). Level two describes the channel morphology (channel alteration, sediment deposition and channel flow status). Level three describes the riparian zone surrounding the stream, which indirectly affects the type of habitat and food resources available in the stream (bank vegetation, bank stability, and riparian zone width). The total habitat scores obtained for each sampling station are compared to a site-specific control or regional reference site. The ratio between the station of interest and the reference site provides a percent comparability that can be used to classify the stream.

Table 6 summarizes WRD's study scores. The IBI, IWB, and Habitat Assessment scores are listed and the watersheds are grouped by those that were not 303(d) listed streams and those that were, as well as by ecoregions (Piedmont and Southeastern Plains). In addition, the table includes the drainage areas upstream of the monitoring points, the county in which the monitoring points are located, and the pollutant source (nonpoint source [NPS], or point source [PS]) or stream type (reference [REF]). Table 7 provides the detailed habitat assessment scores. Any impaired upstream watersheds that contribute to an impaired listed downstream watershed are shaded gray.

During the fish community studies, physical characteristics of the stream were measured at the monitoring sites. These characteristics included the number of bends, number of riffles, number of pools, depth of the deepest pool, average stream depth, and average stream width. In addition, stream water quality measurements were taken at the time of the fish sampling. The parameters measured included water temperature, dissolved oxygen, conductivity, pH, turbidity, total hardness and alkalinity. Table 8 provides a summary of these field measurements.

2.2 Macroinvertebrate Sampling

Beginning in March 2000, the Department of Natural Resources (DNR) Environmental Protection Division (EPD) collected water quality samples at a number of locations in the Piedmont ecoregion monitored by WRD including all the 303(d) listed in that ecoregion. Samples were analyzed to provide data to assess for the presence or absence of chemical pollution. The following analyses were conducted on each sample: dissolved oxygen (DO), temperature, conductivity, pH, turbidity, 5-day biochemical oxygen demand (BOD_5), nitrate-nitrite, ammonia, total phosphorus, total alkalinity, total suspended solids (TSS), total organic carbon (TOC), metals, semi-volatile organics, pesticides, and PCBs. The results are summarized in Table 9. The watersheds are grouped by those that were not 303(d) listed and those that were. Any impaired upstream watersheds that contribute to an impaired listed downstream watershed are shaded gray.

Table 6. 1998-2000 WRD's Fish Community Study Scores (Unimpaired – Piedmont Ecoregion)

Name	Drainage Area upstream from the monitoring point (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Anneewakee Creek upper	15.70	Douglas	PS	38	Fair	7.8	Fair	46.06
Anneewakee Creek lower	17.52	Douglas	PS	42	Fair	8	Fair	55.94
Beech Creek	3.23	Meriwether	NPS	34	Fair	6	Fair	65.78
Big Branch	4.26	Troup	NPS	36	Fair	6.5	Fair	82.48
Blue John Creek middle	7.20	Troup	PS	38	Fair	6.2	Fair	91.28
Copeland Creek	2.14	Heard		34	Fair	7.2	Fair	163.50
Flat Creek	27.09	Troup	PS	36	Fair	8.3	Fair	62.74
Flat Shoals Creek	1.01	Meriwether	NPS	34	Fair	6.9	Fair	77.73
Fromby Creek	1.67	Heard	NPS	40	Fair			61.40
Gum Branch	1.44	Heard		46	Good	6.5	Fair	133.90
Gum Creek	7.72	Heard	REF	50	Good	8.1	Good	121.16
Gum Creek	7.72	Heard	REF	50	Good	8.6	Excellent	120.33
Hillabatchee Creek	22.60	Heard	REF	52	Excellent	10	Excellent	150.28
Little Snake Creek	3.42	Carroll		36	Fair	7.9	Good	154.60
Long Cane Creek up U/S	5.61	Troup	NPS	42	Fair	7.8	Good	68.57
Long Cane Creek up D/S	5.90	Troup	PS	40	Fair	7.3	Good	69.00
Norman Creek	3.02	Carroll		36	Fair	8	Good	144.01
Panther Creek upper	1.76	Troup	NPS	36	Fair	5.7	Poor	89.90
Polecat Creek	4.43	Troup	PS	36	Fair	6.3	Fair	75.59
Red Oak Creek	5.71	Heard		34	Fair	7.1	Fair	114.40
Snake Creek upper	7.38	Carroll		40	Fair	8.1	Good	106.17
Snake Creek upper	7.38	Carroll		46	Good	8.3	Good	147.00
Snake Creek lower	40.60	Carroll		48	Good	9.3	Good	69.73
Town Creek lower	9.90	Heard		46	Good	7.9	Good	133.80
Trib to Whooping	0.78	Carroll		40	Fair	6.5	Fair	122.51
Whooping Creek upper	5.12	Carroll		48	Good	8.6	Excellent	112.15
Whooping Creek lower	26.37	Carroll	REF	56	Excellent	10.4	Excellent	122.78
Wolf Creek	2.68	Carroll	NPS	38	Fair	6.9	Fair	135.98

Table 6. 1998-2000 WRD's Fish Community Study Scores (Unimpaired – Southeastern Plains Ecoregion)

Name	Drainage Area upstream from the monitoring point (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Cemochechbee Creek	25.43	Randolph		36	Fair	6.4	Fair	115.56
Colochee/Frog Bottom Creek	14.15	Stewart		36	Fair	6.3	Fair	85.83
Drag Nasty Creek	13.25	Clay		44	Good	7	Fair	117.23
Flat Creek	27.00	Clay		38	Fair	6.6	Fair	75.33
Holanna Creek	38.00	Quitman		38	Fair	7	Fair	121.00
Kirkland Creek	36.38	Early	REF	50	Good	8.4	Good	133.47
Kolomoki Creek	59.02	Clay		44	Good	8.2	Good	118.16
Ochillee Creek	9.03	Chattahoochee		46	Good	6.6	Fair	151.40
Pataula Creek	147.58	Randolph		48	Good	7.9	Good	141.66
Pumpkin Creek	29.21	Randolph	REF	50	Good	7.7	Good	118.50
Sawhatchee Creek	16.76	Early		38	Fair	6.1	Fair	95.01
Sawhatchee Creek	39.47	Early		44	Good	7	Fair	112.94
Smithee Jack Creek	11.05	Quitman		46	Good	6.9	Fair	76.00
Tobannee Creek	6.18	Quitman		38	Fair	6.5	Fair	120.33

Table 6. 1998-2000 WRD's Fish Community Study Scores (Impaired – Piedmont Ecoregion)

Name	Drainage Area upstream from the monitoring point (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Anneewakee Creek	16.39	Douglas	PS	32	Poor	7.2	Fair	55.40
Blue John Creek upper	6.42	Troup	PS	28	Poor	5.7	Poor	67.70
Blue John Creek lower	9.60	Troup	PS	32	Poor	5.7	Poor	60.00
Cavender Creek	1.18	Carroll	NPS	18	Very Poor	6.9	Fair	150.00
Flat Shoals Trib.	1.53	Meriwether	NPS	24	Very Poor			44.70
Hilly Mill Creek upper	5.67	Heard	NPS	16	Very Poor	4.7	Very Poor	80.70
Hilly Mill Creek	12.25	Heard	NPS	20	Very Poor	5.8	Very Poor	104.90
Long Branch	1.30	Coweta	NPS	16	Very Poor	0.4	Very Poor	36.30
Long Cane Creek midupper	25.91	Troup	PS	22	Very Poor	7.7	Fair	69.40
Long Cane Creek midup	32.60	Troup	PS	26	Poor	6.3	Poor	76.20
Long Cane Creek middle	56.95	Troup	PS	22	Very Poor	6.4	Poor	69.70
Long Cane Creek midlow	66.03	Troup	PS	20	Very Poor	6.9	Poor	72.60
Long Cane Creek midlower	80.62	Troup	PS	20	Very Poor	6.3	Very Poor	63.30
Long Cane Creek	77.94	Troup	PS	20	Very Poor	5.9	Very Poor	63.30
Mineral Springs Branch up	1.33	Coweta	PS	14	Very Poor	3.5	Very Poor	78.30
Mineral Springs Branch down	2.11	Coweta	PS	12	Very Poor	2.3	Very Poor	68.80
Mt. Hope Branch	1.10	Meriwether	NPS	20	Very Poor	4.4	Very Poor	102.40
Ollie Branch	2.17	Meriwether	NPS	26	Poor	4.3	Very Poor	84.60
Panther Creek middle	8.09	Troup	PS	30	Poor	5.3	Poor	71.60
Panther Creek lower	8.90	Troup	PS	24	Very Poor	7.6	Good	55.40
Piney Woods Creek	2.40	Meriwether	NPS	26	Poor	6.5	Fair	68.50
Shoal Creek	2.19	Troup	NPS	26	Poor	4.9	Very Poor	40.70
Snake Creek upper	1.53	Coweta	PS	12	Very Poor	1	Very Poor	65.90
Snake Creek	1.81	Coweta	NPS	20	Very Poor	3.9	Very Poor	42.20
Town Creek	3.26	Heard		28	Poor	7.1	Fair	142.90
Wahoo Creek upper	4.22	Coweta	NPS	18	Very Poor	4.1	Very Poor	49.70
Wahoo Creek middle	7.82	Coweta	PS	22	Very Poor	4.9	Very Poor	70.50
Wahoo Creek	20.58	Coweta	PS	18	Very Poor	6.1	Very Poor	69.80

Table 6. 1998-2000 WRD's Fish Community Study Scores (Impaired – Southeastern Plains Ecoregion)

Name	Drainage Area upstream from the monitoring point (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Black Creek	15.65	Stewart		26	Poor	4.7	Very Poor	54.33
Bustahatchee Creek	8.24	Quitman		30	Poor	6.1	Poor	125.99
Coheelee Creek	21.28	Early		28	Poor	6.2	Fair	92.22
Day Creek	16.43	Stewart		24	Very Poor	4.1	Very Poor	78.14
Hitchitee Creek	39.86	Stewart		30	Poor	6.8	Fair	76.56
Hodchodkee Creek upper	14.38	Chattahoochee		26	Poor	6.6	Fair	130.53
Hodchodkee Creek lower	62.87	Stewart		32	Poor	4.9	Very Poor	83.65
Hog Creek	15.01	Randolph		28	Poor	5.7	Poor	114.28
Little Hitchitee Creek	7.63	Chattahoochee		28	Poor	3.9	Very Poor	65.17
Little Juniper Creek	9.11	Chattahoochee		24	Very Poor	4.1	Very Poor	138.87
Little Pine Knot Creek	5.83	Chattahoochee		22	Very Poor	4.2	Very Poor	142.57
Pataula Creek	8.13	Stewart		30	Poor	5.8	Poor	152.13
Pine Knot Creek	27.95	Marion		32	Poor	5.3	Poor	142.05
Roaring Branch	8.16	Clay		20	Very Poor	4.9	Very Poor	109.68
Tiger Creek	4.21	Muscogee		8	Very Poor	1.8	Very Poor	73.67
Weaver Creek	4.75	Early		28	Poor	6.8	Fair	101.25

Table 7. 1998-2000 WRD's Habitat Assessment Scores (Unimpaired – Piedmont Ecoregion)

Name	Bottom Substrate	Pool Substrate	Pool Variability	Channel Sinuosity	Instream Cover	Epifaunal Substrate	Embeddedness	Riffle Frequency	Channel Alteration	Sediment Deposition	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Anneewakee Creek upper					6.00	2.67	1.33	0.00	12.33	1.83	6.77	2.50	2.40	2.23	2.57	4.83	0.60	46.06
Anneewakee Creek lower					6.00	2.10	1.40	0.00	12.00	2.67	7.67	3.52	3.23	2.85	2.50	9.00	3.00	55.94
Beech Creek					3.00	6.00	5.50	0.00	13.67	6.23	7.57	3.27	3.13	4.07	3.67	9.00	0.67	65.78
Big Branch					6.00	11.92	4.73	0.00	14.33	3.23	8.17	3.77	4.67	3.33	4.33	9.00	9.00	82.48
Blue John Creek middle					11.00	7.33	6.00	10.30	5.33	4.00	11.00	6.33	6.33	4.00	4.33	6.33	9.00	91.28
Copeland Creek					16.70	12.30	15.00	20.00	17.00	15.70	13.70	8.70	8.70	9.00	8.70	9.00	9.00	163.50
Flat Creek					5.00	2.00	2.83	0.00	12.57	3.83	6.80	2.47	2.80	3.67	3.67	8.00	9.10	62.74
Flat Shoals Creek					11.00	0.00	2.17	0.00	17.67	5.00	11.00	3.33	4.50	4.33	5.17	8.33	5.23	77.73
Fromby Creek					6.00	3.30	2.00	1.00	4.00	3.70	13.70	4.00	3.70	3.70	3.30	7.00	6.00	61.40
Gum Branch					15.30	15.30	14.30	15.30	16.30	13.30	10.00	4.30	4.00	3.70	2.70	9.70	9.70	133.90
Gum Creek					7.00	10.10	7.93	19.00	16.43	9.90	11.00	7.93	5.97	7.33	5.33	9.07	4.17	121.16
Gum Creek					14.00	12.00	11.33	18.00	8.67	10.00	12.33	6.33	5.00	6.33	4.67	9.00	2.67	120.33
Hillabatchee Creek					14.00	9.57	15.03	19.00	16.00	15.17	8.17	9.00	8.33	8.67	8.00	9.67	9.67	150.28
Little Snake Creek					17.70	17.00	15.70	16.30	11.70	14.00	11.30	8.00	8.30	8.30	8.00	9.30	9.00	154.60
Long Cane Creek up U/S					5.00	2.00	2.07	0.00	15.57	3.40	7.07	3.90	3.73	3.93	4.00	8.90	9.00	68.57
Long Cane Creek up D/S					6.00	0.33	1.50	0.00	9.33	6.10	7.77	5.57	5.33	5.10	4.77	8.67	8.53	69.00
Norman Creek					14.00	17.00	15.30	16.60	11.60	14.60	15.60	6.33	6.33	6.66	6.66	6.00	7.33	144.01
Panther Creek upper					4.70	8.10	3.90	13.50	13.30	5.60	8.80	3.30	4.50	3.70	4.80	8.50	7.20	89.90
Polecat Creek					6.00	7.77	4.33	18.00	12.50	3.83	8.02	2.87	2.97	3.63	3.67	0.77	1.23	75.59
Red Oak Creek					11.00	10.00	9.00	14.00	9.70	8.70	12.30	6.00	5.70	4.30	5.00	9.70	9.00	114.40
Snake Creek upper					7.00	10.53	11.90	10.30	13.33	11.17	5.83	4.33	4.47	4.67	5.87	8.10	8.67	106.17
Snake Creek upper					13.00	18.00	11.67	18.33	13.67	14.00	12.00	7.67	7.33	7.00	7.00	9.00	8.33	147.00
Snake Creek lower					3.00	2.57	1.77	0.00	15.90	3.83	6.90	7.00	5.40	6.53	4.63	8.43	3.77	69.73
Town Creek lower					8.00	13.00	14.90	15.10	16.43	14.97	8.90	6.07	6.57	5.47	6.53	8.73	9.13	133.80
Trib to Whooping					14.00	14.30	14.60	18.00	7.66	14.30	10.00	3.33	3.33	2.33	2.00	9.33	9.33	122.51
Whooping Creek upper					13.60	11.30	12.00	15.30	7.00	11.00	15.30	4.00	3.66	4.33	4.00	9.00	1.66	112.15
Whooping Creek lower					9.00	9.10	13.23	18.50	16.57	10.57	6.90	7.23	6.00	6.67	4.77	9.67	4.57	122.78
Wolf Creek					13.60	13.60	11.60	15.00	14.60	11.30	10.30	6.33	6.33	7.33	7.33	9.33	9.33	135.98

Table 7. 1998-2000 WRD's Habitat Assessment Scores (Unimpaired – Southeastern Plains Ecoregion)

Name	Bottom Substrate	Pool Substrate	Pool Variability	Channel Sinuosity	Instream Cover	Epifaunal Substrate	Embeddedness	Riffle Frequency	Channel Alteration	Sediment Deposition	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Cemochechbee Creek	10.83	9.33	3.00	16.00					16.10	7.83	10.67	7.10	7.67	6.50	6.63	8.33	5.57	115.56
Colochee/Frog Bottom Creek	3.00	0.00	0.00	0.00					13.33	12.33	16.00	3.67	3.67	7.33	7.50	9.67	9.33	85.83
Drag Nasty Creek	6.57	10.57	3.10	17.00					14.33	14.33	8.00	6.33	7.00	6.23	6.43	8.67	8.67	117.23
Flat Creek	5.67	3.33	0.00	13.00					15.33	1.00	6.00	3.00	5.00	3.33	4.67	8.33	6.67	75.33
Holanna Creek	16.67	11.00	7.00	8.00					17.33	11.33	7.33	6.00	5.33	6.67	7.00	8.67	8.67	121.00
Kirkland Creek	12.00	12.57	11.23	16.00					15.13	12.77	10.33	6.77	6.57	7.20	6.90	7.23	8.77	133.47
Kolomoki Creek	10.33	12.00	7.67	10.00					13.33	10.00	9.33	7.53	7.77	7.43	7.23	7.87	7.67	118.16
Ochillee Creek	15.33	8.43	17.67	15.00					17.67	15.10	11.50	8.27	8.23	7.10	7.43	9.77	9.90	151.40
Pataula Creek	18.33	13.00	10.33	12.00					17.33	12.67	11.00	6.33	6.67	7.67	7.33	9.67	9.33	141.66
Pumpkin Creek	14.33	8.63	6.30	16.00					16.90	6.77	7.90	7.32	7.08	5.57	5.43	7.50	8.77	118.50
Sawhatchee Creek	5.00	7.67	1.33	18.00					16.50	9.33	5.67	3.50	3.67	5.67	5.67	7.67	5.33	95.01
Sawhatchee Creek	6.33	9.40	8.67	17.00					17.33	8.67	7.67	4.57	4.57	5.57	5.73	8.10	9.33	112.94
Smithee Jack Creek	6.00	0.00	0.00	12.00					16.67	0.33	6.67	4.00	4.33	4.00	4.33	8.67	9.00	76.00
Tobannee Creek	15.67	10.00	9.67	15.00					15.33	8.67	9.33	4.67	5.33	4.67	5.33	8.33	8.33	120.33

Table 7. 1998-2000 WRD's Habitat Assessment Scores (Impaired – Piedmont Ecoregion)

Name	Bottom Substrate	Pool Substrate	Pool Variability	Channel Sinuosity	Instream Cover	Epifaunal Substrate	Embeddedness	Riffle Frequency	Channel Alteration	Sediment Deposition	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Anneewakee Creek					5.40	2.00	2.20	0.00	14.30	3.30	7.00	3.60	3.60	3.00	2.80	6.40	1.80	55.40
Blue John Creek upper					6.30	2.70	2.00	3.30	4.00	5.00	16.30	4.00	4.70	2.70	2.70	5.30	8.70	67.70
Blue John Creek lower					5.00	2.30	2.00	0.00	6.30	1.70	10.70	5.30	4.70	4.00	4.30	4.70	9.00	60.00
Cavender Creek					18.00	12.70	11.30	18.30	11.70	13.00	15.70	8.70	9.00	8.30	8.30	7.00	8.00	150.00
Flat Shoals Trib.					4.30	1.30	2.30	0.00	13.50	2.30	8.50	3.40	3.10	2.20	2.20	0.80	0.80	44.70
Hilly Mill Creek upper					7.70	0.70	3.80	17.00	12.30	3.30	14.30	3.40	3.40	4.00	4.20	3.30	3.30	80.70
Hilly Mill Creek					7.80	12.20	9.60	13.00	17.30	7.60	9.30	3.70	4.50	3.40	3.90	9.00	3.60	104.90
Long Branch					2.30	1.00	1.00	0.00	5.00	1.30	8.00	2.00	2.70	2.70	2.30	1.00	7.00	36.30
Long Cane Creek midupper					8.20	0.80	1.40	0.00	15.60	5.30	13.50	4.80	4.90	3.80	3.70	4.50	2.90	69.40
Long Cane Creek midup					7.40	2.00	1.00	0.00	16.80	6.00	7.70	4.80	4.80	4.50	4.60	9.10	7.50	76.20
Long Cane Creek middle					9.40	0.70	1.80	0.00	16.30	4.50	6.60	3.80	3.40	2.80	2.70	8.90	8.80	69.70
Long Cane Creek midlow					10.30	1.90	2.70	0.00	17.10	3.00	6.70	3.20	2.80	3.90	3.90	8.40	8.70	72.60
Long Cane Creek midlower					5.30	2.00	1.40	0.00	16.70	4.10	7.30	2.40	1.70	2.70	1.50	9.10	9.10	63.30
Long Cane Creek					5.40	1.10	0.80	0.00	16.70	4.80	8.00	4.60	2.50	4.70	1.40	5.90	7.40	63.30
Mineral Springs Branch up					8.00	8.30	4.70	14.00	7.00	5.30	10.70	2.30	2.00	4.00	3.30	6.70	2.00	78.30
Mineral Springs Branch down					8.00	6.30	4.00	8.70	6.00	3.30	11.70	3.70	3.70	1.70	2.00	7.00	2.70	68.80
Mt. Hope Branch					5.00	9.60	12.60	18.50	11.70	11.40	8.20	1.50	1.70	2.10	2.30	8.80	9.00	102.40
Ollie Branch					6.70	9.70	4.00	0.00	16.00	7.10	7.70	5.10	5.40	4.50	4.70	5.20	8.50	84.60
Panther Creek middle					7.70	2.90	3.90	0.00	13.70	4.20	9.00	3.60	3.60	3.40	3.40	7.90	8.30	71.60
Panther Creek lower					4.40	1.00	1.50	0.00	14.60	1.60	8.20	3.00	3.30	3.10	4.20	1.70	8.80	55.40
Piney Woods Creek					6.30	6.40	4.90	12.50	10.00	4.90	10.10	3.00	2.50	3.50	2.70	0.90	0.80	68.50
Shoal Creek					2.50	2.80	4.30	0.00	11.00	2.60	7.80	1.80	1.90	2.20	2.70	0.50	0.60	40.70
Snake Creek upper					3.00	7.70	4.00	8.30	3.00	2.30	9.30	2.70	3.00	1.30	1.30	10.00	10.00	65.90
Snake Creek					3.70	2.00	1.30	0.70	2.70	2.30	9.30	1.30	1.30	0.00	0.30	10.00	7.30	42.20
Town Creek					13.00	12.30	15.70	17.00	9.00	14.00	16.30	7.00	7.00	7.30	7.30	10.00	7.00	142.90
Wahoo Creek upper					5.30	2.30	5.30	0.70	5.30	3.00	7.70	1.70	2.00	1.70	1.70	4.00	9.00	49.70
Wahoo Creek middle					11.00	6.30	1.70	2.00	10.00	4.00	9.30	2.30	2.70	2.30	2.30	8.30	8.30	70.50
Wahoo Creek					7.60	0.00	0.30	0.00	11.00	2.70	15.60	4.70	4.20	6.30	6.20	6.40	4.80	69.80

Table 7. 1998-2000 WRD's Habitat Assessment Scores (Impaired – Southeastern Plains Ecoregion)

Name	Bottom Substrate	Pool Substrate	Pool Variability	Channel Sinuosity	Instream Cover	Epifaunal Substrate	Embeddedness	Riffle Frequency	Channel Alteration	Sediment Deposition	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Black Creek	4.17	7.00	3.00	0.00					14.50	2.00	6.00	2.17	2.33	4.17	4.33	1.33	3.33	54.33
Bustahatchee Creek	15.33	11.67	9.33	17.00					15.33	7.00	8.33	5.67	6.00	6.00	5.67	9.33	9.33	125.99
Coheelee Creek	5.33	1.00	0.00	16.00					15.00	10.23	7.00	6.00	6.33	4.50	4.67	6.83	9.33	92.22
Day Creek	4.53	3.87	3.13	0.00					15.67	0.33	9.67	4.27	5.27	6.60	6.60	9.10	9.10	78.14
Hitchitee Creek	4.33	0.00	0.00	15.00					16.67	0.33	6.77	3.97	4.33	4.57	4.97	8.05	7.57	76.56
Hodchodkee Creek upper	9.33	9.40	8.33	16.00					17.33	15.67	10.03	7.10	7.67	4.70	4.97	10.00	10.00	130.53
Hodchodkee Creek lower	5.33	0.00	0.00	14.00					16.00	0.33	9.33	4.67	5.00	5.33	5.33	9.00	9.33	83.65
Hog Creek	11.90	10.83	6.67	12.00					17.67	7.07	9.67	5.83	5.57	4.40	5.67	8.67	8.33	114.28
Little Hitchitee Creek	3.90	0.00	0.00	0.00					14.00	0.57	4.57	6.23	5.67	5.90	7.77	8.33	8.23	65.17
Little Juniper Creek	9.00	9.00	2.00	16.00					17.33	18.77	11.00	8.90	8.90	8.87	9.10	10.00	10.00	138.87
Little Pine Knot Creek	11.57	9.73	8.00	14.00					16.90	18.53	11.20	8.67	8.67	7.43	7.87	10.00	10.00	142.57
Pataula Creek	13.00	10.50	10.00	17.00					18.43	17.57	15.23	8.53	8.67	6.23	7.30	10.00	9.67	152.13
Pine Knot Creek	14.00	13.53	13.60	17.00					18.57	12.67	8.50	6.77	6.57	6.67	6.17	8.77	9.23	142.05
Roaring Branch	12.00	7.00	9.00	3.00					14.33	13.33	6.67	5.67	5.67	7.00	6.67	9.67	9.67	109.68
Tiger Creek	3.83	0.00	0.00	12.00					9.00	3.67	13.67	6.17	5.50	5.00	4.83	7.83	2.17	73.67
Weaver Creek	3.00	5.00	2.00	14.00					17.00	4.00	7.50	8.00	7.25	7.50	7.50	9.50	9.00	101.25

Table 8. 1998-2000 WRD's Field Measurements (Unimpaired –Piedmont Ecoregion)

Name	Number of Bends	Number of Riffles	Number of Pools	Deepest Pool (m)	Average Stream Depth (m)	Average Stream Width (m)	Water Temperature (deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS)	pH	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Anneewakee Creek upper		0	6	0.94	0.20	6.3	26.6	6.97	73.0	7.04	4.24	21.0	25.0
Anneewakee Creek lower		0	13	1.20	0.34	7.6	24.3	5.25	161.3	6.81	6.52	27.0	30.0
Beech Creek		1	1	0.70	0.08	2.9	18.6	8.71	42.8	7.4	16.40	17.0	25.0
Big Branch		2	6	0.74	0.25	5.5	20.5	5.88	41.5	6.88	28.60	13.0	20.0
Blue John Creek middle		0	3	0.00	0.10	5.2	17.0	8.25	112.5				
Copeland Creek													
Flat Creek		0	7	0.85	0.27	7.5	24.8	6.70	74.5	7.42	10.50	31.00	40.00
Flat Shoals Creek		0	1	0.77	0.26	2.4	18.1	3.51	42.9	6.52	30.70	15.0	30.0
Fromby Creek													
Gum Branch													
Gum Creek		7	6	1.06	0.21	6.9	20.5	8.02	31.1	6.39	6.56	11.0	20.0
Gum Creek		7	10	1.65	0.25	7.4	21.3	7.81	27.8	6.92	10.10		
Hillabatchee Creek		6	15	2.00	0.29	18.5	20.2	8.16	22.3	7.08	4.51	7.0	15.0
Little Snake Creek													
Long Cane Creek up U/S		0	7	1.05	0.28	3.9	19.8	6.72	67.7	7.18	27.30	28.0	35.0
Long Cane Creek up D/S		0	7	1.27	0.49	5.6	24.3	6.35	74.9	6.70	15.80	29.0	40.0
Norman Creek		8	7	0.80	0.10	5.6	18.0	8.28	24.8	6.78	8.17		
Panther Creek upper		1	1	0.55	0.10	2.5	15.9	8.83	47.1	7.15	15.40	18.0	25.0
Polecat Creek		2	4	0.85	0.26	4.1	24.2	7.20	44.3	6.59	16.00	12.0	20.0
Red Oak Creek													
Snake Creek upper		2	1	0.59	0.14	5.3	22.0	8.20	31.9		3.76	8.0	15.0
Snake Creek upper		10	6	0.71	0.16	7.5	25.3	7.61	31.8	7.12	11.30		
Snake Creek lower		0	6	0.72	0.25	8.5	25.6	8.02	33.1		12.30	12.0	15.0
Town Creek lower		5	6	1.50	0.27	8.8	21.3	7.90	24.0	7.03	4.62	8.0	15.0
Trib to Whooping		5	4	0.90	0.10	2.5	20.2	8.14	32.8	6.43	8.93		
Whooping Creek upper		5	10	0.83	0.10	5.5	22.7	6.88	36.2	6.64	9.75		
Whooping Creek lower		8	7	0.95	0.20	11.1	20.2	7.98	27.9		4.19	9.0	20.0
Wolf Creek		5	11	0.84	0.10	4.7	22.2	7.68	32.8	6.8	6.58		

Table 8. 1998-2000 WRD's Field Measurements (Unimpaired – Southeastern Plains Ecoregion)

Name	Number of Bends	Number of Riffles	Number of Pools	Deepest Pool (m)	Average Stream Depth (m)	Average Stream Width (m)	Water Temperature (deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS)	pH	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Black Creek	1.00		1	0.50	0.15	5.1	17.1	9.16	39.8	5.50	14.20	12.0	
Bustahatchee Creek	3.00		17	1.14	0.42	7.9	20.9	7.30	23.4	6.50	22.00	8.0	10.0
Coheelee Creek	4.00		0	0.00	0.18	5.8	25.7	7.27	73.5	7.00	4.17	30.0	30.0
Day Creek	1.00		0	0.00	0.14	4.6	23.2	6.05	21.0	6.00	35.20	7.0	10.0
Hitchitee Creek	3.00		0	0.00	0.09	7.4	27.1	7.21	23.7	6.50	12.50	12.0	5.0
Hodchodkee Creek	5.00		8	1.25	0.38	5.2	15.5	8.62	17.6	6.10	8.45	5.0	
Hodchodkee Creek	5.00		0	0.00	0.05	6.6	24.2	7.94	10.6	7.00	40.40	12.0	15.0
Hog Creek	5.00		4	0.78	0.16	3.8	24.3	7.01	47.9	7.00	26.50	18.0	20.0
Little Hitchitee Creek	0.00		0	0.00	0.06	6.3	22.9	7.87	54.7	5.50	13.80	12.0	5.0
Little Juniper Creek	6.00		6	0.92	0.29	4.4	15.0	9.15	9.6	6.00	3.35	5.0	5.0
Little Pine Knot Creek	4.00		8	0.92	0.37	3.6	15.7	8.34	17.3	6.30	3.65	6.0	5.0
Pataula Creek	3.00		2	0.70	0.25	3.7	15.2	7.89	42.3	7.00	28.60	22.0	
Pine Knot Creek	7.00		9	1.50	0.62	6.8	22.7	8.49	20.1	5.00	2.45	3.0	5.0
Roaring Branch	3.00		4	0.76	0.14	1.60	22.2	8.1	48.60	7.0	9.63	22.00	20.0

Table 8. 1998-2000 WRD's Field Measurements (Impaired –Piedmont Ecoregion)

Name	Number of Bends	Number of Riffles	Number of Pools	Deepest Pool (m)	Average Stream Depth (m)	Average Stream Width (m)	Water Temperature (deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS)	pH	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Anneewakee Creek		0	6	1.50	0.20	5.3	26.4	5.60	216.4	7.03	2.99	34.0	30.0
Blue John Creek upper		1	6	0.95	0.20	7.7	16.7	7.08	118.0	6.98			
Blue John Creek lower		0	1	0.50	0.10	7.5	16.3	6.63	45.0	7.07	6.36		
Cavender Creek		6	13	0.62	0.10	3.9	22.4	8.50	32.8	6.60	3.65		
Flat Shoals Trib.		0	0	0.00	0.10	1.8	17.0	8.43	47.6	7.21	20.40	15.0	30.0
Hilly Mill Creek upper		6	5	1.20	0.20	3.9	21.0	5.40	42.3	6.72	12.60	16.0	20.0
Hilly Mill Creek		4	4	0.80	0.20	5.3	18.7	7.68	39.7	6.72		15.00	25.00
Long Branch		0	1	0.28	0.10	2.4	26.2	7.46	53.6	7.10	8.42		
Long Cane Creek midupper		0	6	71.50	0.50	10.0	25.7	5.08	81.8	6.94	16.90	44.0	45.0
Long Cane Creek midup		0	8	1.50	0.40	9.2	26.1	5.33	87.1	7.00	7.91	36.0	50.0
Long Cane Creek middle		0	14	1.50	0.20	8.3	26.3	5.79	146.1	7.20	6.44	63.0	70.0
Long Cane Creek midlow		0	12	1.50	0.30	8.6	25.8	5.50	131.5	7.41	4.90	61.0	55.0
Long Cane Creek midlower		0	11	1.25	0.30	6.7	26.5	6.48	114.7	7.31	7.20	52.0	60.0
Long Cane Creek		0	10	1.50	0.40	7.7	25.9	7.93	120.3	7.40	4.90	51.0	60.0
Mineral Springs Branch up		3	5	0.66	0.10	2.6	21.8	6.73	106.4	6.99	7.63		
Mineral Springs Branch down		1	6	0.70	0.10	4.0	23.3	7.44	1515.0	6.59	8.10		
Mt. Hope Branch		5	0	0.00	0.10	1.7	19.8	7.67	12.0	5.78	8.98	2.0	5.0
Ollie Branch		1	3	1.25	0.10	2.5	18.9	5.60	55.3	6.90	22.60	2.0	35.0
Panther Creek middle		0	7	1.25	0.20	4.6	25.5	6.25	96.5	7.05	16.20	51.3	60.0
Panther Creek lower		0	1	0.53	0.10	2.5	25.2	7.25	66.8	7.32	14.20	21.0	35.0
Piney Woods Creek		2	1	0.90	0.10	3.6	20.6	6.68	60.8	6.81	11.90	25.0	30.0
Shoal Creek		0	0	0.00	8.10	2.2	15.6	8.22	55.8	7.06	26.40	22.0	30.0
Snake Creek upper		0	5	0.55	0.10	2.2	15.4	7.60	63.7				
Snake Creek		0	0	0.92	0.10	2.1	15.6	7.96	62.4				
Town Creek		11	16	1.00	0.20	7.5	18.8	8.54	21.8	7.06	3.36		
Wahoo Creek upper		2	2	0.48	0.00	4.9	23.4	6.60	124.9	7.12			
Wahoo Creek middle		0	9	1.20	0.30	5.4	24.7	5.62	217.6	7.06	9.17		
Wahoo Creek		0	6	1.25	0.00	9.70	20.7	5.1	132.00	7.2	15.40	44.00	45.0

Table 8. 1998-2000 WRD's Field Measurements (Impaired – Southeastern Plains Ecoregion)

Name	Number of Bends	Number of Riffles	Number of Pools	Deepest Pool (m)	Average Stream Depth (m)	Average Stream Width (m)	Water Temperature (deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS)	pH	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Black Creek	1.00		1	0.50	0.15	5.1	17.1	9.16	39.8	5.50	14.20	12.0	
Bustahatchee Creek	3.00		17	1.14	0.42	7.9	20.9	7.30	23.4	6.50	22.00	8.0	10.0
Coheelee Creek	4.00		0	0.00	0.18	5.8	25.7	7.27	73.5	7.00	4.17	30.0	30.0
Day Creek	1.00		0	0.00	0.14	4.6	23.2	6.05	21.0	6.00	35.20	7.0	10.0
Hitchitee Creek	3.00		0	0.00	0.09	7.4	27.1	7.21	23.7	6.50	12.50	12.0	5.0
Hodchodkee Creek upper	5.00		8	1.25	0.38	5.2	15.5	8.62	17.6	6.10	8.45	5.0	
Hodchodkee Creek lower	5.00		0	0.00	0.05	6.6	24.2	7.94	10.6	7.00	40.40	12.0	15.0
Hog Creek	5.00		4	0.78	0.16	3.8	24.3	7.01	47.9	7.00	26.50	18.0	20.0
Little Hitchitee Creek	0.00		0	0.00	0.06	6.3	22.9	7.87	54.7	5.50	13.80	12.0	5.0
Little Juniper Creek	6.00		6	0.92	0.29	4.4	15.0	9.15	9.6	6.00	3.35	5.0	5.0
Little Pine Knot Creek	4.00		8	0.92	0.37	3.6	15.7	8.34	17.3	6.30	3.65	6.0	5.0
Pataula Creek	3.00		2	0.70	0.25	3.7	15.2	7.89	42.3	7.00	28.60	22.0	
Pine Knot Creek	7.00		9	1.50	0.62	6.8	22.7	8.49	20.1	5.00	2.45	3.0	5.0
Roaring Branch	3.00		4	0.76	0.14	1.60	22.2	8.1	48.60	7.0	9.63	22.00	20.0
Tiger Creek	2.00		0	0.00	0.20	2.5	17.7	7.85	34.5	6.30	28.90	12.0	
Weaver Creek	5.00		1	0.53	0.12	1.9	19.3	7.20	203.2	7.50	4.39	154.0	160.0

Table 9. 2000 EPD's Field Measurements and Water Chemistry (Piedmont Ecoregion)

Name	Depth (m)	Width (m)	DO (mg/L)	Water Temperature (deg C)	pH	Conductivity (umohs/cm)	Turbidity (NTU)	TSS (mg/L)	Chemical Violations
Hillabatchee Creek	0.21	17.6	9.63	16.95	7.33	22	no chemical samples		
Panther Creek upper	0.27	2.33	7.04	19.57	6.79	55	no chemical samples		
Whooping Creek lower	0.18	11.78	8.63	20.62	6.84	26	no chemical samples		
Anneewakee Creek middle	0.36	5.54	6.87	21.65	6.82	191	no chemical samples		
Blue John Creek upper	0.14	2.27	5.42	21.07	7.11	196	no chemical samples		
Blue John Creek lower	0.18	4.1	6.7	19.37	7.02	118	29	46	None
Cavender Creek	0.11	4.8	9.06	15.74	6.6	37	30	6	None
Flat Shoals Trib.	0.03	0.96	7.82	22.85	6.77	138	11	10	None
Hilly Mill Creek upper	n/a	n/a	7.66	16.45	6.56	28	7	2	None
Hilly Mill Creek	0.24	3.84	6.65	20.44	6.56	47	9	6	None
Long Branch	0.32	2.8	9.1	15.5	6.79	40	13	11	None
Long Cane Creek midupper	0.2	10.23	5.08	25.7	6.94	81.8	8	5	None
Long Cane Creek midup	0.3	5.59	2.25	23.54	7.08	120	6	1	None
Long Cane Creek middle	0.325	8.64	4.9	25.33	6.85	104	10	3	None
Long Cane Creek midlow	0.42	9.54	6.42	24.49	6.97	91	11	7	None
Long Cane Creek midlower	0.41	7.89	5.69	24.27	6.68	82	11	12	None
Long Cane Creek	0.32	8.47	6.16	23.64	6.67	72	13	19	None
Mineral Springs Branch upper	0.22	2.13	no hydrolab readings				7	6	None
Mineral Springs Branch lower	0.15	2.68	no hydrolab readings				6	6	None; NH_3=1.1 mg/l
Mt. Hope Branch	Dry creek						2	3	None
Ollie Branch	0.16	1.9	7.7	22.19	7.06	104	7	3	None
Panther Creek middle	0.25	2.16	4.85	20.68	7.22	112	6	4	None
Panther Creek lower	0.24	2.86	5.71	21.9	7.33	64	12	16	None
Piney Woods Creek	0.46	5.11	4.99	23.65	6.44	90	11	13	None
Shoal Creek	0.11	2.5	6.47	24.34	7.02	70	11	14	None
Snake Creek upper	0.11	2.9	8.72	13.17	6.68	64	25	4	None
Snake Creek lower	0.145	3.68	4.09	18.81	6.62	101	no chemical samples		
Town Creek	0.22	5.31	7.95	22.05	6.69	19	3	ND	None
Wahoo Creek upper	0.42	5.57	9.19	12.51	6.98	86	64	41	None
Wahoo Creek middle	0.375	5.13	9.24	10.04	6.63	219	60	77	None

Wahoo Creek	0.38	6.4	8.09	13.72	6.7	50	66	15	None

EPD also conducted macroinvertebrate sampling at several of the locations to provide additional information and insight concerning water quality conditions. Macroinvertebrate sampling was conducted using a modified version of EPA's Rapid Bioassessment Protocol III. Macroinvertebrate data results were evaluated using seven metrics as a measure of diversity, community composition (e.g., prevalence of tolerant or intolerant organisms), and environmental stress from a variety of possible sources. These data and metric calculation results were compared to those from reference streams located in the Piedmont ecoregion (GAWPB, 2000). In conjunction with macroinvertebrate sampling, habitat assessments were performed. The habitat assessments were conducted using the same procedures described in the previous section.

All WRD impaired sites in the Piedmont ecoregion were monitored by EPD. Table 10 summaries EPD's macroinvertebrate study scores and includes the IBI, IBW, Benthic and Habitat Assessment scores. The watersheds are grouped by those that were not 303(d) listed and those that were, as well as by ecoregions (Piedmont and Southeastern Plains). Table 11 provides EPD's detailed habitat assessment scores. Habitat scores are subjective measurements that can vary between evaluators, as well as temporally and spatially. In general, each habitat assessment score is the average of three independent values that are determined on the same day. WRD performed their habitat assessments from April through September. EPD performed their assessment from mid-August through early October. The correlation between WRD and EPD habitat scores is 70.74 percent.

Field personnel also performed a pebble count at those sampling locations where macroinvertebrate samples were collected. Pebble counts were conducted to document streambed particle-size distribution. The modified Wolman Pebble Count procedure was used, where 100 random particle samples are measured. A zig-zag collection technique was used that allows a longitudinal stream reach, incorporating pools and riffles, to be collected along a continuum instead of individual cross-sections (GAWPB, 2000). The results of the Pebble Count are given in Table 12.

Visual observations of the stream and watershed were also made by EPD personnel. The type of land use and the extent of land-disturbing activities and other pertinent features of the watershed were systematically observed from all available road accesses and were recorded. This information was used to determine the potential sources of eroded soils and other possible contaminants.

Table 10. 2000 EPD's Macroinvertebrate Community Study Scores (Piedmont Ecoregion)

Name	County	Drainage Basin Area (sq	IBI Score	IBI Category	IWB Score	IWB Category	Benthic Score	Rank	Habitat Total
Hillabatchee Creek	Heard	22.60	52	Excellent	10	Excellent	57	Fair	160.0
Panther Creek upper	Troup	1.76	36	Fair	5.7	Poor	34	Poor	85.3
Whooping Creek lower	Carroll	26.37	56	Excellent	10.4	Excellent	55	Fair	144.0
Anneewakee Creek middle	Douglas	16.39	32	Poor	7.2	Fair	11	Very Poor	68.7
Blue John Creek upper	Troup	6.42	28	Poor	5.7	Poor	24	Very Poor	31.4
Blue John Creek lower	Troup	9.60	32	Poor	5.7	Poor	20	Very Poor	37.2
Cavender Creek	Carroll	1.18	18	Very Poor	6.9	Fair	68	Good/Fair	138.0
Flat Shoals Trib.	Meriwether	1.53	24	Very Poor			43	Poor	52.0
Hilly Mill Creek upper	Heard	5.67	16	Very Poor	4.7	Very Poor	Too deep to sample		
Hilly Mill Creek	Heard	12.25	20	Very Poor	5.8	Very Poor	32	Poor	80.0
Long Branch	Coweta	1.30	16	Very Poor	0.4	Very Poor	0	Very Poor	67.0
Long Cane Creek midupper	Troup	25.91	22	Very Poor	7.7	Fair	14	Very Poor	43.3
Long Cane Creek midup	Troup	32.60	26	Poor	6.3	Poor	11	Very Poor	59.3
Long Cane Creek middle	Troup	56.95	22	Very Poor	6.4	Poor	26	Very Poor	64.5
Long Cane Creek midlow	Troup	66.03	20	Very Poor	6.9	Poor	17	Very Poor	62.9
Long Cane Creek midlower	Troup	77.94	20	Very Poor	5.9	Very Poor	30	Poor	66.5
Long Cane Creek	Troup	80.62	20	Very Poor	6.3	Very Poor	32	Poor	55.3
Mineral Springs Branch upper	Coweta	1.33	14	Very Poor	3.5	Very Poor	10	Very Poor	66.3
Mineral Springs Branch lower	Coweta	2.11	12	Very Poor	2.3	Very Poor	10	Very Poor	63.8
Mt. Hope Branch	Meriwether	1.10	20	Very Poor	4.4	Very Poor	Dry creek		
Ollie Branch	Meriwether	2.17	26	Poor	4.3	Very Poor	21	Very Poor	79.8
Panther Creek middle	Troup	8.09	30	Poor	5.3	Poor	0	Very Poor	49.5
Panther Creek lower	Troup	8.90	24	Very Poor	7.6	Good	24	Very Poor	71.2
Piney Woods Creek	Meriwether	2.40	26	Poor	6.5	Fair	21	Very Poor	46.8

Shoal Creek	Troup	2.19	26	Poor	4.9	Very Poor	56	Fair	52.3
Snake Creek upper	Coweta	1.53	12	Very Poor	1	Very Poor	Rapid survey		88.7
Snake Creek lower	Coweta	1.81	20	Very Poor	3.9	Very Poor	0	Very Poor	61.3
Town Creek	Heard	3.26	28	Poor	7.1	Fair	44	Poor	134.0
Wahoo Creek upper	Coweta	4.22	18	Very Poor	4.1	Very Poor	22	Very Poor	74.4
Wahoo Creek middle	Coweta	7.82	22	Very Poor	4.9	Very Poor	65	Fair	81.5
Wahoo Creek	Coweta	20.58	18	Very Poor	6.1	Very Poor	34	Poor	73.3

Table 11. 2000 EPD's Habitat Assessment Scores (Piedmont Ecoregion)

Name	Instream Cover	Epifaunal Substrate	Embeddedness	Channel Alteration	Sediment Deposition	Riffle Frequency	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Assessment Score
Hillabatchee Creek	16.4	16.2	15.8	16.8	17	17.6	12.4	8	8.2	6.2	7	9	9.4	160
Panther Creek upper	6.25	7.5	6.5	15.75	7	9.5	6.75	4.25	4.25	2	2.75	7.75	5	85.25
Whooping Creek lower	15.2	16	14.8	16	13.2	13.6	9	7.6	8.2	7.2	5.6	9	8.4	144
Anneewakee Creek middle	11.67	3	0.67	14.67	1	0	12.67	6.33	6.33	4.33	3.67	3.33	1	68.67
Blue John Creek upper	4.6	0.6	1.8	6	3.4	0	4.6	2.2	2.6	1.4	1.8	1.2	1.2	31.4
Blue John Creek lower	5.2	0.4	1.2	8.4	1.8	0.4	4.2	2.4	2.4	2.4	2	1.4	5	37.2
Cavender Creek	17	7	12	15	14	18	15	8	8	8	7	5	4	138
Flat Shoals Trib.	5.75	1	2.25	15.75	2.5	0	5	5.75	5.75	3	3	1	1.25	52
Hilly Mill Creek upper	Creek was too deep to sample													
Hilly Mill Creek	8.25	2.5	6	15.25	8	1.75	7	5.75	6	2.25	4.25	9	4	80
Long Branch	5.25	0	1.25	16.75	2.5	0	15	4.25	4.25	4.75	3.75	2.5	6.75	67
Long Cane Creek midupper	4	0	2.25	14	1.5	0	5.5	2.25	3	3.5	3.25	3.75	0.25	43.25
Long Cane Creek midup	5.75	0.25	2	15.25	2.75	0	5.5	3.25	3.25	2.75	4	7.25	7.25	59.25
Long Cane Creek middle	5.75	0	3.25	16	2.75	0.25	6	5	5.25	4.75	4.75	5.75	5	64.5
Long Cane Creek midlow	7.5	0	3.5	15.75	3	0	6.38	4.5	4.5	1.75	1.75	6.5	7.75	62.88
Long Cane Creek midlower	5.75	0	3.75	17	3.5	0	5.75	4.75	4.75	4	2.25	6.75	8.25	66.5
Long Cane Creek	6	0	3.25	16.5	4.75	0	6.25	3	3.25	2.25	2	2	6	55.25
Mineral Springs Branch upper	5.25	3	5.25	14.75	3.75	0.25	6	5	5.25	5.5	6	2.25	4	66.25
Mineral Springs Branch lower	6.25	4	4.75	14.25	4.75	2.5	6.5	4	4.25	2.75	2.75	4.25	2.75	63.75
Mt. Hope Branch	Creek was dry													
Ollie Branch	7	3	4.25	17.5	6.5	2.5	6.75	6.75	6.75	4	4.75	3.75	6.25	79.75
Panther Creek middle	5.5	0.5	1.75	10.25	2	0	6.25	2.75	3	1	1	7.75	7.75	49.5
Panther Creek lower	5	0.2	1.2	16.4	3	0	11.8	6.6	6.2	5.4	6.4	0.4	8.6	71.2
Piney Woods Creek	5	0.25	1.75	7	5.75	0	12.25	4.75	4.75	2.25	2.5	0.25	0.25	46.75
Shoal Creek	3	2	5	13	5.5	0.5	6.5	4	4	3.5	3.5	0.5	1.25	52.25
Snake Creek upper	9.33	6	8	19.33	4.33	6	6.33	3	3	2.33	3.33	8.67	9	88.65
Snake Creek lower	6	2.33	1.33	12	1.33	0	4.33	7.33	4.67	3	2	8.67	8.33	61.32
Town Creek	14	11	14.25	16.5	13	13	8.75	7	7	6.75	6.75	9	7	134
Wahoo Creek upper	5.88	0	2	16.5	2.75	0.5	15.5	2.5	3	3.25	4	9	9.5	74.38
Wahoo Creek middle	11.75	2.25	9.75	16.25	5.75	2	10.25	2.25	2.5	2.5	3.5	3.75	9	81.5
Wahoo Creek	8.25	2.25	2.5	9.75	3.5	1	8.5	9	8.75	6.25	6.25	5.5	1.75	73.25

Table 12. Pebble Counts (Piedmont Ecoregion)

Name	Silt/Clay/Sand 0.062-0.125mm	Fine 0.125-0.25 mm	Medium 0.25-0.5 mm	Coarse 0.5-1 mm	Very Coarse 1-2 mm	Fine Gravel 2-4 mm	Fine Gravel 6-8 mm	Medium Gravel 8-10 mm	Coarse to Very Coarse >10 mm	Small Cobble 64 - 127 mm	Large Cobble 128-255 mm	Small Boulder 256-511 mm	Medium Boulder 512-1023 mm	Large Boulder 1024-2047 mm	Very Large Boulder	Bedrock	Total
Hillabatchee Creek	6		2	1		2		4	3	4	1	1	1		2	73	100
Panther Creek upper	13	2	7	9	2	1		5	3	17	21	10	2			8	100
Whooping Creek lower	1			3	1	1	2	1	2	5	6	7	10	9	11	41	100
Anneewakee Creek middle	3	3	11	11	17	18	9	14	4	2	1	4		2		1	100
Blue John Creek upper			1	19	29	21		5	15	8	1	1					100
Blue John Creek lower	13	6	26	24	19	9			3								100
Cavender Creek	Creek was sampled prior to pebble count being added to the SOP																
Flat Shoals Trib.	Not conducted																
Hilly Mill Creek upper	Creek to deep to sample																
Hilly Mill Creek	7	3	4	11	5	6		5	5	39	15						100
Long Branch	25	21	12	19	15	3	3	2									100
Long Cane Creek midupper	9	1	7	11	25	38		4	5								100
Long Cane Creek midup	22	2	12	19	31	8	1	2		1			2				100
Long Cane Creek middle	10	2	15	38	8	15		2	6	4							100
Long Cane Creek midlow	17	10	11	40	15	5		2									100
Long Cane Creek midlower	13	2	25	23	19	14		2	1		1						100
Long Cane Creek	19	7	12	20	33	5		3		1							100
Mineral Springs Branch upper	4			23	12	32		2	8	19							100
Mineral Springs Branch lower	5	8	6	17	9	7		4	15	24	1				1	3	100
Mt. Hope Branch	Creek was dry																
Ollie Branch	19	1	9	16	23	12	2	2		2	3	1	3	1	1	5	100
Panther Creek middle	22	7	13	20	22	10	3	2	1								100
Panther Creek lower	39		8	41	11	1											100
Piney Woods Creek	Creek to deep to sample																
Shoal Creek	32	4	4	5	6	14	1	7	11	14	2						100
Snake Creek upper	Creek was sampled prior to pebble count being added to the SOP																
Snake Creek lower	4	4	11	23	27	19		7	4	1							100
Town Creek	10	1		2	4	7			4	28	17	4		1	3	19	100
Wahoo Creek upper	7	6	6	15	4	6	6	21	23	6							100
Wahoo Creek middle	17	5	5	7	3	8	5	6	15	28	1						100
Wahoo Creek	11	1	12	29	15	11	6	9	6								100

3.0 SOURCE ASSESSMENT

A healthy aquatic ecosystem requires a healthy habitat. The major disturbance to stream habitats is erosion and sedimentation. As sediment is carried into the stream, it changes the stream bottom and smothers sensitive organisms. Turbidity associated with sediment loads may also impair recreational and drinking water uses (GAEPD, 1998).

A source assessment characterizes the known and suspected sources of sediment in the watershed for use in a water quality model and the development of the TMDL. The general sources of sediment are point and nonpoint sources. National Pollutant Discharge Elimination System (NPDES) permittees discharging treated wastewater are the primary point sources of sediment as total suspended solids (TSS) and/or turbidity.

Nonpoint sources of sediment are diffuse sources that cannot be identified as entering the water body at a single location. These sources generally involve land use activities that contribute sediment to streams during a rainfall runoff event. Nonpoint sources of sediment included in the source assessment analysis are:

- Silviculture,
- Agriculture,
- Grazing areas,
- Mining sites,
- Roads, and
- Urban Development

For nonpoint sources involving silviculture, the Georgia Forestry Commission (GFC) was consulted for information and parameters regarding silviculture activities. The Natural Resources Conservation Service (NRCS) was consulted for information and parameters regarding agricultural activities.

3.1 Point Source Assessment

For purposes of this TMDL, facilities permitted under the National Pollutant Discharge Elimination System (NPDES) will be considered point sources. Discharges from municipal and industrial facilities may contribute sediment to receiving waters as TSS and/or turbidity. There are twelve permitted NPDES discharges identified in the Chattahoochee River Basin watersheds upstream from the listed segments. Table 13 provides the permitted flow, TSS concentrations and loads for the NPDES permits located in the impaired Chattahoochee River Basin watersheds. The levels discharged over the last six years are given, as well as the calculated TSS load. These data were determined from analysis of the available Discharge Monitoring Reports (DMR).

Table 13. NPDES Permit Limits For Facilities in the Impaired Watersheds of the Chattahoochee River Basin

FACILITY	NPDES PERMIT NO	FACILITY TYPE	RECEIVING WATER	FLOW (MGD)		TSS (lbs/day)		TSS (mg/L)				TSS Load
				Monthly Average	Weekly Average	Daily Average	Daily Max	Monthly Average	Weekly Average	Daily Average	Daily Max	Annual (ton/yr)
Brian Center Nursing Care	GA0029998	Private	Unnamed trib to Blue John	0.019	0.024			30.00			45.00	
connected to LaGrange WPCP 9/97			Creek	0.013	0.017			15.65			112.00	0.306
Douglasville Southside WPCP	GA0030341	Municipal	Annewakee Creek					30.00	45.00			
				2.239				7.85				26.749
Interstate Wastewater Services	GA0032565	Private	Long Cane Creek	0.035	0.044			30.00	45.00			
(formerly Raylar Corp.)				0.026	0.040			14.54	56.00			0.54
Lumpkin WPCP	GA0021032	Municipal	Hodchodkee Creek trib to	0.20	0.25			90.00	120.00			
			Patuala Creek	0.17	0.17			21.87	88.00			5.73
Milliken & Co. - Duncan Stewart	GA0024791	Industrial	Long Cane Creek			2.50	3.75					
Plant				0.004		0.317	1.839					0.058
Moore's Mobile Home Park	GA0031518	Private	Blue John Creek	0.006	0.008			30.00			45.00	
connected to LaGrange WPCP 9/97				0.001	0.002			8.25			15.00	0.0033
Newnan - Wahoo Creek WPCP	GA0031721	Municipal	Unnamed trib to Wahoo	3.00	3.80			30.00	45.00			
			Creek	1.37	1.37			6.10				12.71
Newnan - Snake Creek WPCP	GA0021431	Municipal	Snake Creek trib to Wahoo	0.40	0.50			30.00	45.00			
diverted to Wahoo WPCP 10/97			Creek	0.28	0.28			24.18	24.18			10.27
Randolph-Clay Middle High School	GA0035874	Private	Hog Creek to	0.030	0.038			30.00	45.00			
			Cemochechobee Creek	0.004	0.004			4.16	4.39			0.02
Vulcan Construction Materials -	GA0024422	Industrial	Panther Creek to Long Cane							55	110	
LaGrange Quarry Outfall 001			Creek	0.97	3.96					7.44	240.00	10.95
Vulcan Construction Materials -	GA0024422	Industrial	Panther Creek to Long Cane							55	110	
LaGrange Quarry Outfall 003			Creek	0.01	0.36					37.5	003: 80	0.64
William L. Bonnell Company	GA0000507	Industrial	Mineral Springs Branch			301.00	634.00					
				0.44		28.96	112.00					5.285

permit limits
actual data from monthly DMR

It should be noted that three of the facilities listed in Table 13 currently do not discharge into the Chattahoochee River Basin. The discharges for Brian Center Nursing Care and Moore's Mobile Home Park were connected to LaGrange Long Cane Creek WPCP in September 1997. The Newnan Snake Creek WPCP discharge was diverted to the Newnan Wahoo Creek WPCP in October 1997.

LaGrange Long Cane Creek WPCP, Milliken Duncan Stewart Plant, Newnan Wahoo Creek WPCP, and William L. Bonnell Company report metals in their DMRs. The City of LaGrange Long Cane Creek WPCP discharges into the Chattahoochee River. The facility is required in its permit to monitor total recoverable mercury, but no discharge limit is specified. For the past six years, no mercury readings were reported in the DMRs. LaGrange also reports chromium, copper, and zinc. Three readings were reported for each of these metals, which yielded the following averages: chromium – 0.020 mg/L, copper – 0.021 mg/L, and zinc – 0.058 mg/L. Milliken Duncan Stewart Plant discharges into Long Cane Creek. There are no specified metal limits in its permit; however, copper and zinc were reported on one occasion. On May 21, 1996, a copper concentration of 0.01 mg/L was reported along with a zinc concentration of 0.05 mg/L. The Newnan Wahoo Creek WPCP discharges into an unnamed tributary of Wahoo Creek. There are no metal limits specified in its permit, although the facility does reports copper in its DMRs. Over the last six years, the average copper concentration discharged was 0.036 mg/L. The William L. Bonnell Company discharges into Mineral Springs Branch and is permitted to discharge 14.1 lbs/day of total aluminum, 0.77 lbs/day of total chromium, 2.58 lbs/day of zinc, 0.54 lbs/day of total cyanide and 5.2 µg/L of free cyanide. The company exceeded its total aluminum permit limit on June 28, 1996 and on July 31, 1997. No exceedences occurred for the other permitted metals. These metal discharges may have affected the fish communities in the listed streams.

The ammonia concentrations discharged from four facilities were also reviewed: Douglasville Southside WPCP, Interstate Wastewater Services (formerly Raylar Corporation), LaGrange Long Cane Creek WPCP, and Newnan Wahoo Creek WPCP. Allowable effluent ammonia concentrations to protect against ammonia toxicity were developed for these facilities according to the 1999 Ambient Water Quality Criteria for Ammonia (USEPA, 1999a). The City of Douglasville Southside WPCP discharges to Annewakee Creek and has monthly ammonia limits ranging from 2.1 to 9.0 mg/L. Monthly ammonia limits calculated using the 1999 Ambient Water Quality Criteria for Ammonia range from 4.5 to 24.5 mg/L. Douglasville exceeded its permit limit of 4.4 mg/L once in December 2000, but has never exceeded the calculated 1999 ammonia criteria limits. Interstate Wastewater Services, which discharges to Long Cane Creek, has a monthly ammonia permit limit of 17.4 mg/L. This is protective of the stream based on the 1999 ammonia criteria. During the past six years, Interstate has not exceeded its permit limit or its calculated 1999 ammonia criteria limit. LaGrange Long Cane Creek WPCP has a monthly ammonia permit limit of 2.0 mg/L, which is protective of the creek. This facility never exceeded its permit limit or the calculated 1999 ammonia criteria limit over the past six years. The City of Newnan Wahoo Creek WPCP has monthly ammonia limits ranging from 1.1 to 5.6 mg/L. The calculated 1999 ammonia criteria limits for this facility range from 2.6 to 10.9 mg/L. Based on available DMR data, Newnan Wahoo Creek exceeded its ammonia permit limits during the months of May 1997, June 1997, and July 1997. During the month of June 1997, the reported ammonia concentration was 5.0 mg/L, which exceeds both the permit limit of 1.4 mg/L and the 1999 criteria limit of 3.3 mg/L. The ammonia concentrations in this discharge may have affected the fish communities in the listed streams.

Total residual chlorine (TRC) concentrations are reported at the following municipal facilities: Douglasville Southside WPCP, LaGrange Long Cane Creek WPCP, and Newnan Wahoo Creek WPCP. TRC criteria at these facilities are daily maximum limitations. At the Douglasville and Newnan facilities, TRC is analyzed to the specific detection limit of 0.10 mg/L, as specified in

the permit. The City of Douglasville Southside WPCP is permitted to discharge 0.015 mg/L TRC. This maximum daily limit was exceeded thirteen times in the last six years with exceedences occurring in July 1997, October 1997, January 1998, March 1998, December 2000, January 2001, and October 2001. The City of LaGrange Long Cane Creek WPCP has a TRC limit of 0.39 mg/L. This limit was exceeded for seven days during the months of March 1996, November 1996, December 1996, and September 2000. The daily TRC limit for the City of Newnan Wahoo Creek WPCP is currently 0.013 mg/L. This TRC limit is a modification to the permitted, made in March 1999, to prevent an exceedence of the instream concentration of 11 μg/L. This current TRC limit was exceeded in all months from January 1996 to March 1998 except for fifty-one days. However, these were not exceedences of the TRC permit limit (0.14 mg/L) at that time. The high TRC discharges from these municipal facilities may have affected the fish communities in the listed streams.

Soil erosion from construction sites is a major source of sediment in Georgia's streams. Georgia requires construction sites over five acres to have a General Storm Water NPDES permit. A Notice of Intent (NOI) must be submitted to the State for each construction site over five acres in order for its storm water to be covered under this permit. The permit authorizes the discharge of storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in the permit. All sites are required to have an Erosion and Sedimentation Control Plan; to implement, inspect and maintain BMPs; and to monitor storm water for turbidity. In March 2003, this permit will also cover all construction sites disturbing between one and five acres.

3.2 Nonpoint Source Assessment

Eroded soils from forests, cropland, mining sites, and other land are transported to Georgia streams through runoff. Excessive sediment that reaches streams can cause several changes. It can make streams shallower and wider, affecting the stream's temperature, dissolved oxygen, flow rate and velocity. It can affect the ability of the stream to assimilate pollutants. It can change the diversity of fish populations and other biological communities. It can also cause increased flooding. In addition, harmful pollutants attached to the sediment can be transported to rivers and streams.

3.2.1 Silviculture

Georgia has 23.6 million acres of commercial forests. This represents approximately 64 percent of all of Georgia's land use. Approximately 68 percent of the commercial forests are privately owned, 25 percent are owned by industry, and 7 percent are publicly held (GAEPD, 1999).

The majority of soil erosion from forested land occurs during timber harvesting and the period immediately following, as well as reforestation. Once the forest is re-established, very little soil erosion occurs. Timber harvesting includes the layout of access roads, log decks, and skid trails, the construction and stabilization of these areas, and the cutting of trees. Both hardwoods and pines are harvested throughout Georgia. A minimum harvest is usually ten acres and the percent of forest that is harvested each year varies from county to county. Table 14 lists the percent timberland and percent harvested per year by county.

Table 14. Percent Timberland and Percent Harvested per Year by County

County	Total Area (1000 acres)	Timberland (1000 acres)	Percent Timberland	Growing Stock Volume (million ft^3) [a]	Annual Volume Removal (million ft^3)	Annual percent Removal
Carroll	319.5	185.8	58.15%	291.4	11.0	3.77%
Chattahoochee	159.2	142.0	89.20%	168.6	5.0	2.97%
Clay	124.9	82.0	65.65%	105.2	3.1	2.95%
Coweta	283.6	195.4	68.90%	330.3	5.3	1.60%
Douglas	127.6	79.3	62.15%	182.9	3.6	1.97%
Early	327.2	151.5	46.30%	156.8	8.9	5.68%
Harris	296.8	238.4	80.32%	260.3	10.0	3.84%
Heard	189.5	151.6	80.00%	169.0	10.2	6.04%
Marion	234.9	188.2	80.12%	126.3	5.3	4.20%
Meriwether	322.1	230.7	71.62%	234.2	21.1	9.01%
Muscogee	138.4	86.2	62.28%	140.6	3.1	2.20%
Quitman	97.0	80.5	82.99%	103.5	1.2	1.16%
Randolph	274.7	180.7	65.78%	166.6	8.7	5.22%
Stewart	293.6	253.7	86.41%	203.1	20.7	10.19%
Troup	264.9	182.7	68.97%	334.1	8.3	2.48%

[a] Estimate - does not include trees less than 5" DBH.
Source: Thomas, Michael T., 1997. Forest Statistics for Georgia

3.2.2 Agriculture

Agriculture can be a significant contributor of nonpoint pollutants to rivers and streams. Sediment and nutrients are the major pollutants of concern and cropland is one of the major sources of soil loss due to sheet and rill erosion. Over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. In 1950, there were 208,000 farms encompassing 26 million acres in Georgia (U.S. Department of Agriculture, National Agricultural Statistics Service website). In 2000, there were approximately 11.1 million acres of farmland in Georgia, with the number of farms estimated to be 50,000 and the average farm size being approximately 222 acres. This represents a 57 percent reduction in farmland.

With the reduction in farmland, there has also been a decrease in the amount of soil erosion. The National Resources Inventory found the total wind and water erosion on cropland and Conservation Reserve Program land in Georgia declined 38 percent, from 3.1 billion tons per year in 1982 to 1.9 billion tons in 1997 (Source: 1997 NRI, USDA NRCS). This suggest that the source of sediment in many of the impaired streams in the Chattahoochee River Basin may be

the result of past land use practices. Thus, it is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

3.2.3 Grazing Areas

Farm animals grazing on pasture land can leave areas of ground with little or no vegetative cover. During a rainfall runoff event, the soil in the pastures is eroded and transported to nearby streams, typically by gully erosion. The amount of soil loss from gully erosion is generally less than that caused by sheet and rill erosion. Work in small grazed catchments in New Mexico found that gully erosion contributed only 1.4 percent of the total sediment load as compared to sheet and rill erosion. Other research had found that gully erosion typically contributes less than 30 percent of the total sediment load; however, contributions have ranged from 0 to 89 percent (USEPA, 2001b).

Beef cattle spend all their time grazing in pastures; while dairy cattle and hogs are confined periodically. Hog farms confine the animals or allow them to graze in small pastures or pens. On dairy farms, the cows are confined for a limited period each day, during which time they are fed and milked.

In addition, cattle and other unconfined animals often have direct access to streams that pass through pastures. As these animals walk down to the stream, they often damage stream banks. Stream bank vegetation is destroyed and the banks often collapse, resulting in increased sedimentation to the waterway.

3.2.4 Mining Sites

Minerals, rocks, and ores are found in natural deposits on or in the earth. Kaolin, clays, granite, marble, sand, gravel, and other mineral products are the materials primarily mined in Georgia. Surface mining involves the activities and processes used to remove minerals, ores, or other solid material. Tunnels, shafts and dimension stone quarries are not considered to be surface mines. Surface mining encompasses a variety of activities from sand dredging to open pit clay mining to hard rock aggregate quarrying.

Removal of vegetation, displacement of soils and other significant land disturbing activities are typically associated with surface mining. These operations can result in accelerated erosion and sedimentation of surface waters. Table 15 lists the active, inactive, and exploratory mines located in the watersheds monitored in the Chattahoochee River Basin.

3.2.5 Roads

Erosion from unpaved roadways can be a significant source of sediment to our rivers and streams. It occurs when soil particles are loosened and carried away from the roadway, ditch, or road bank by water, wind, or traffic. The actual road construction (including erosive road-fill soil types, shape and size of coarse surface aggregate, poor subsurface and/or surface drainage, poor road bed construction, roadway shape, and inadequate runoff discharge outlets or “turn-outs” from the roadway) may aggravate roadway erosion. In addition, external factors such as roadway shading and light exposure, traffic patterns, and road maintenance may also affect roadway erosion.

Table 15. Mines Located in the Chattahoochee River Basin Watersheds

Name	Company	Type	County	Current	Material Mined
Mrs. J D Morelands Property	Mrs. J D Moreland	Unknown	Coweta	Exp Prospect	Stone, Granite DM
Smiths Store Prospect		Surface Undergrnd	Troup	Exp Prospect	Mica
Garner Mine		Surface Mine	Randolph	Past Producer	Aluminium, Bauxite
Lumpkin Mine/Mill	Lumpkin Mining Company	Surface Mine	Quitman	Past Producer	Iron
Sam Hill Quarry	Samuel L Hill	Surface Mine	Coweta	Past Producer	Stone, Granite DM
Springvale Mine		Surface Mine	Randolph	Past Producer	Aluminum, Bauxite
Spring Creek Quarry	Georgia Rock Products	Surface Mine	Early	Past Producer	Stone, Limestone CB
Stewart Mine/Operations	Dunbar Layton Mining	Surface Mine	Stewart	Past Producer	Iron, Goethite
The Oddessa Quarry	Georgia Quincy Granite Co.	Surface Mine	Meriwether	Past Producer	Stone, Granite DM
Wade Quarry		Surface Mine	Randolph	Past Producer	Stone, Limestone CB
Williamson Quarry		Surface Mine	Randolph	Past Producer	Stone, Limestone CB
Yarboro Mine		Surface Mine	Randolph	Past Producer	Aluminium, Bauxite
Douglasville Quarry	Consolidated Quarries Div	Surface Mine	Douglas	Producer	Stone, Granite CB
Lagrange Quarry	Vulcan Materials Co Se Div.	Surface Mine	Troup	Producer	Stone, Granite DM

Source: USEPA, 2001a. Watershed Characterization System (WCS) Data, Georgia, US. Tetra Tech, Environmental Protection Agency, Region IV, Atlanta, Georgia , Jan 31, 2001.

Exposed soils, high runoff velocities and volumes, and poor road compaction all increase the potential for erosion. Loose soil particles are often carried from the road bed into the roadway drainage ditches. Some of these particles settle out satisfactorily, but usually they settle out poorly, causing diminished ditch carrying capacity resulting in roadway flooding and, subsequently, more roadway erosion (Choctawhatchee, et. al, 2000).

3.2.6 Urban Development

Soil erosion from land disturbing activities is a major source of sediment in Georgia's streams. Land-disturbing activities are defined as any activity that may result in soil erosion and the movement of sediments into state waters or on lands of the state. Examples of land disturbing activities include clearing, grading, excavating, or filling of land. The following activities are unconditionally exempt from the provisions of the Erosion and Sedimentation Act; surface mining, granite quarrying, minor land-disturbing activities such as home gardens and landscaping, agricultural and silvicultural operations, and any project carried out under the technical supervision of the NRCS.

Conversion of forest to urban land use is often associated with water quality degradation. From 1982 through 1989, the area classified as commercial forest within the Chattahoochee River Basin decreased by approximately 1053 acres or 0.0045 percent (GAEPD, 1998). It should be noted that forest undergoing conversion to another land use is not considered silviculture, but rather a land disturbing activity.

Storm water runoff from developed urban areas can also have an impact on the transport of sediment to and within streams. Urbanization increases imperviousness, resulting in an increase in the volume of runoff entering the streams. In addition, the streamflow rates may increase significantly from pre-construction rates causing stream bank erosion and stream bottom down cutting.

4.0 MODELING APPROACH

Establishing the relationship between the in-stream water quality and the source loadings is an important component of TMDL development. It provides for both the identification of sources, and their relative contribution, as well as the examination of potential water quality changes resulting from varying management options to meet the water quality standard. This relationship can be developed using a variety of techniques ranging from simple methods based on scientific principles to more complex numerical computer modeling techniques.

In this section, the numerical modeling techniques developed to simulate sediment fate and transport in the watershed are discussed. The limited amount of sediment loading data and in-stream sediment information prevents EPD from using a dynamic watershed runoff model, which requires a great deal of data for model development and calibration. Instead, EPD determined the annual sediment loads delivered to the stream from the surrounding watershed. This TMDL does not address in-stream sedimentation processes, such as bank erosion and stream bottom down cutting, since computer models that simulate these processes are not available at this time.

4.1 Model Selection

The Agricultural Research Station (ARS) developed the Universal Soil Loss Equation (USLE) over 30 years ago. It is the most widely accepted and most used soil loss equation. It was designed as a method to predict average annual soil loss caused by sheet and rill erosion. The USLE can estimate long-term soil loss and can assist in choosing proper cropping, management and conservation practices. However, it cannot be used to determine erosion for a specific year or specific storm. Because of the wide acceptance by the forestry, agricultural, and academic communities, the USLE was selected as the tool for estimating long-term annual soil erosion, assessing the impacts of various land uses, and evaluating the benefits of various Best Management Practices (BMPs).

4.2 Universal Soil Loss Equation

For each of the watersheds monitored in the Chattahoochee River Basin, the existing annual sediment load was estimated using the USLE. The USLE predicts the average annual soil loss caused by sheet and rill erosion. Soil loss from sheet and rill erosion is mainly due to detachment of soil particles during rainfall events. It is the major source of soil loss from crop production and animal grazing areas, logging areas, mine sites, unpaved roads, and construction sites. The equation used for estimating average annual soil erosion is:

$$A = RKLSCP$$

Where:

A = average annual soil loss in tons/acre
R = rainfall erosivity index
K = soil erodibility factor
LS = topographic factor
    L = slope length
    S = slope
C = cropping factor
P = conservation practice factor

4.2.1 Rainfall Erosivity Index

The R factor or rainfall erosivity index describes the kinetic energy generated by the frequency and intensity of the rainfall. It is statistically calculated from the annual summation of rainfall energy in every storm, which correlates to the raindrop size, times its maximum 30-minute intensity. It varies geographically and Table 16 gives the R factors for the counties with modeled watersheds within the Chattahoochee River Basin.

Table 16. R factors by County

County	R factor
Carroll	325.0
Chattahoochee	350.0
Clay	362.5
Coweta	325.0
Douglas	300.0
Early	400.0
Harris	325.0
Heard	337.5
Marion	337.5
Meriwether	325.0
Muscogee	337.5
Quitman	362.5
Randolph	350.0
Stewart	350.0
Troup	325.0

4.2.2 Soil Erodibility Factor

The K factor or soil erodibility factor represents the susceptibility of soil to be eroded. This factor quantifies the cohesive or bonding character of the soil and the ability of the soil to resist detachment and transport during a rainfall event. It is a function of the soil type, which is provided by the STATSGO data. Table 5 provides a breakdown of the soil type within each modeled watershed and the corresponding K factor. STATSGO soil data has a resolution of 1:250,000 and is available for all of Georgia. A higher-resolution (1:25,000) soil data, SSURGO, is available for fourteen Georgia counties. For consistency, it was decided that STATSGO data would be used for the first round or phase of sediment TMDLs because of its availability for all of Georgia. During the second phase of sediment TMDLS, if SSURGO data is available for all of Georgia, it may be used.

4.2.3 Topographic Factor

The LS factor or topographic factor represents the effect of slope length and slope steepness on erosion. Steeper slopes produce higher overland flow velocities. Longer slopes accumulate more runoff from larger areas and also result in higher overflow velocities. The slope length and slope is based on the grid size and ground slope provided by the USGS 30 by 30 meter Digital Elevation Model (DEM) grids downloaded from the State GIS clearinghouse.

4.2.4 Cropping factor

The C factor or cropping factor represents the effect plants, soil cover, soil biomass, and soil disturbing activities have on erosion. It is the most complicated of the USLE factors. It incorporates effects of tillage, crop type, cropping history, and crop yield. Cropping factors for forested, agricultural, and urban lands were provided by the Georgia Forestry Commission (GFC), Natural Resources Conservation Service (NRCS), and U.S. Environmental Protection Agency (EPA), respectively.

Forested land includes both mature trees and those being harvested. The forest C factor for each watershed was calculated based on the percent of forest harvested in each county (see Table 14). If a watershed is in multiple counties, the percent forest harvested is determined by area-weighting the forested area within each county.

C factors for cropland and pasture land for each county were developed by NRCS under the National Resource Inventory Program and are listed in Table 17. These values were developed based on the 1995 MRLC data. Low-level aerial photography was performed and the photographs are interpreted to identify land features. If data were not available for a given county, the C factor was calculated by averaging the C factors from all the surrounding counties. The crop and pasture land C factors for watersheds in multiple counties were determined by area-weighting the agricultural land use within each county.

Table 17. Cropland and Pasture C factors by County

County	C factor	
	Cropland	Pasture
Carroll	0.272	0.003
Chattahoochee	0.418	0.003
Clay	0.307	0.004
Coweta	0.433	0.005
Douglas	0.385	0.003
Early	0.408	0.004
Harris	0.418	0.006
Heard	0.460	0.007
Marion	0.336	0.003
Meriwether	0.360	0.004
Muscogee	0.510	0.003
Quitman	0.395	0.003
Randolph	0.391	0.003
Stewart	0.408	0.003
Troup	0.418	0.003

Source: USDA-NCRS, 1997. National Resources Inventory; USDA-NCRS Athens, Georgia

C factors for the road networks were determined based on the road surface and are given in Table 18. Road information, including road surface, was provided by the Georgia Department of Transportation (DOT). Data gaps were filled based on adjacent road surfaces and road types (i.e., state, county, private).

Table 18. Road C factors

Road Surface	Type	C factor
Rigid and High Flexible Road	1	0.13
Bituminous Surfaced Road	2	0.25
Gravel or Stone Road	3	0.65
Soil-Surfaced Road	4	0.75
Primitive or Unimproved Road	5	0.75

C factors for other land uses including urban, mining, transitional, grass, and wetlands are listed in Table 19. These values were provided by the U.S. Environmental Protection Agency (EPA) and are used in all watersheds.

Table 19. Various Land Use C factors

Land Use	C factor
Water	0
Low Intensity Residential	0.02
High Intensity Residential	0.005
High Intensity Commercial, Industrial, Transportation	0.003
Bare rock, sand, clay	0
Quarries, strip mines, gravel pits	0.75
Transitional	0.002
Other Grasses	0.003
Woody Wetlands	0.011
Emergent Herbaceous Wetlands	0.003

4.2.5 Conservation Practice Factor

The P factor or conservation practice factor represents the effects of conservation practices on erosion. The conservation practices include Best Management Practices (BMPs) such as contour farming, strip cropping and terraces. In all cases, it was assumed that no BMPs were used and the P factor for all land uses was 1.0.

4.3 WCS Sediment Tool

EPA and Tetra Tech developed the Arcview-based Watershed Characterization System (WCS) to provide tools for characterizing various watersheds. WCS was used to display and analyze geographic information system (GIS) data including land use, soil type, ground slope, road networks, point source discharges, and watershed characteristics.

An extension of WCS is the Sediment Tool, which incorporates the USLE. The Sediment Tool can be used to perform the following tasks:

- Estimate the extent and distribution of potential soil erosion within a watershed.
- Estimate the potential sediment delivery to the receiving water body.
- Evaluate the effects of land use, BMPs, and road networks on erosion and sediment delivery.

The watersheds of interest were delineated based on the RF3 stream coverage and elevation data. If there was no RF3 segment within the delineated watershed, the WCS Sediment Tool could not be used.

A stream grid for each delineated watershed was created based on elevation data. The stream grid corresponded to a stream network with twenty-five 30 by 30 meter headwater cells (5.5 acres). The stream grid network incorporates flow and has the ability to accumulate flow.

For each 30 by 30 meter grid cell within the watershed, the WCS Sediment Tool calculates the potential erosion using the USLE based on the specific cell characteristics. The model then calculates the potential sediment delivery to the stream grid network. Sediment delivery can be calculated using one of the four available sediment delivery equations:

- Distance-based equation

  $Md = M * (1-0.97 * D/L)$

  where Md = mass moved (tons/acre/yr)
  M = sediment mass eroded (ton)
  D = least cost distance from a cell to the nearest stream grid (ft)
  L = maximum distance the sediment may travel (ft)

- Distance Slope-based equation

  $DR = \exp(-0.4233 * L * Sf)$

  where DR = sediment delivery ration
  $Sf = \exp(-16.1 * r/L + 0.057)) - 0.6$
  L = distance to the stream (m)
  r = relief to the stream (m)

- Area-based equation

  $DR = 0.417762 * A^{(-0.134958)} - 1.27097, \quad DR <= 1.0$

  where DR = sediment delivery ratio
  A = area (sq miles)

- WEPP-based regression equation

$$Z = 0.9004 - 0.1341 * X - 0.0465 * X^2 + 0.00749 * X^3 - 0.0399 * Y + 0.0144 * Y^2 + 0.00308 * Y^3$$

where Z = percent of source sediment passing to the next grid cell
X = cumulative distance downslope
Y = percent slope in the grid cell

Based on work previously performed by EPA on the Chattooga River Watershed, it was determined that the distance slope-based equation provided the best prediction of the sediment delivery (USEPA, 2001b).

The WCS Sediment Tool estimates the total annual soil erosion and sediment delivered to the stream from each grid cell according to its land use cover and the grids representing roads.

5.0 TOTAL MAXIMUM DAILY LOAD

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be assimilated by the receiving waterbody without exceeding the applicable water quality standard; in this case the narrative water quality standard for aquatic life. A TMDL is the sum of the individual waste load allocations (WLAs) and load allocations (LAs) for nonpoint sources and natural background (40 CFR 130.2) for a given waterbody. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. For sediment, the TMDLS are expressed as tons/yr.

Conceptually, a TMDL can be expressed as follows:

$$TMDL = \Sigma WLAs + \Sigma LAs + MOS$$

This TMDL determines the allowable sediment loads to the impaired Chattahoochee River Basin streams and is based on the hypothesis that an impaired watershed having an annual average sediment loading rate similar to the biological reference watersheds will remain stable and not be biologically impaired due to sediment. The average sediment loads of the reference watersheds in the Piedmont and Southeastern Plains ecoregions within the Chattahoochee and Flint River Basins are 0.63 tons/acre/yr (ranging from 0.30 to 1.26 tons/acre/yr) and 1.07 tons/acre/yr (ranging from 0.04 to 1.84 tons/acre/yr), respectively. The following sections describe the various sediment TMDL components.

5.1 Waste Load Allocations

The waste load allocations are provided to the point sources. There are twenty-one NPDES permitted facilities in the Chattahoochee River Basin watersheds. Eight of these facilities are surface mines, which are constantly changing locations from year to year. Discharges from these sites consist of accumulated surface water, pit-pumpout water, groundwater, and storm water runoff associated with mining activities authorized under approved Mined Land Use Plans. These discharges are covered under NPDES permits, but have no numeric limits. However, these discharges shall not violate the Water Quality Standards in the receiving streams and shall not discharge floating solids or visible foam in other than trace amounts. The waste load allocation (WLA) from these sites is included in the load allocation (LA) for the mining land use discussed in the following section. The daily maximum and annual allocated TSS loads for the other thirteen facilities are given in Table 20.

The WLA loads were calculated based on the design flow and average monthly permitted TSS concentration for the municipal facilities, or the average measured flow and average daily permitted TSS concentration level for the industrial facilities.

Table 20. Waste Load Allocations

FACILITY	NPDES PERMIT NO	RECEIVING WATER	COUNTY	TSS Load	
				Daily Max (lbs/day)	Annual (ton/yr)
Douglasville Southside WPCP	GA0030341	Annewakee Creek	Douglas	813.2	148.4
Interstate Wastewater Services	GA0032565	Long Cane Creek	Troup	8.8	1.6
Lumpkin WPCP	GA0021032	Hodchodkee Creek trib to Patuala Creek	Stewart	150.1	27.4
Milliken & Co. - Duncan Stewart	GA0024791	Long Cane Creek	Troup	2.5	0.5
Newnan - Wahoo Creek WPCP	GA0031721	Unnamed trib to Wahoo	Coweta	750.6	137.0
Randolph-Clay Middle High School	GA0035874	Hog Creek to Cemochechobee Creek	Randolph	7.5	1.4
Vulcan Construction Materials - 001	GA0024422	Panther Creek to Long Cane Creek	Troup	496.7	90.7
Vulcan Construction Materials - 003	GA0024422	Panther Creek to Long Cane Creek	Troup	Q*55	Q*55
William L. Bonnell Company	GA0000507	Mineral Springs Branch	Coweta	301.0	54.9

Average annual load assumes discharge every day at average daily flow

The sediment load allocation from future construction sites within the watershed will have to meet the requirements outlined in the Georgia General Storm Water NPDES Permit for Construction Activities. This permit authorizes the discharge of storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through VII of the Georgia Storm Water Permit. The conditions of the permit were established to assure that the storm water runoff from these sites does not cause or contribute sediment to the stream. Georgia's General Storm Water Permit can be considered a water quality-based permit in that the numeric limits in the permit, if met, will not cause a water quality problem.

5.2 Load Allocations

The USLE was used to determine the relative sediment contributions from each significant land use. The USLE was applied to those watersheds that are biologically impaired and those that are not, to estimate the current sediment loading rates to the streams. The current sediment load allocation for each stream by land use, including roads, is reported in Table 21. The watersheds are grouped according to 303(d) listing. For comparison purposes, the total sediment load in tons per acre per year is also given. Table 22 gives each source's percent contribution to the total sediment load.

Understanding the potential sediment sources and the changes in land use that have occurred over the last century provides insight into the streams' current water quality issues. The average annual sediment load per unit area for the unimpaired and impaired watersheds are generally within the same range. Over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. Since 1950, there has been a 57 percent reduction in

Table 21. Sediment Load Allocations (Unimpaired – Piedmont Ecoregion)

Sediment Load (tons/yr)																		
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road	Total	load (tons/acre/yr)
Anneewakee Creek up	0.00	629.30	33.93	27.54	0.00	936.43	1.10	6.77	2.48	3.65	14.82	2614.59	14.59			585.17	4870.37	0.49
Anneewakee Creek low	0.00	668.61	34.52	30.01	0.00	936.43	1.10	7.65	2.81	4.09	17.00	2876.95	14.61			633.15	5226.92	0.48
Beech Creek	0.00			0.17			6.11	5.14	6.73	4.71	3.02	232.05		39.65		96.12	393.69	0.20
Big Branch	0.00	4.70		1.07			4.19	2.70	5.26	2.72	28.93	2273.01		70.87	0.16	46.46	2440.06	0.91
Blue John Creek middle	0.00	504.01	23.66	24.21				1.67	2.05	2.52	23.37	3608.09	23.05	0.07		403.02	4615.71	1.05
Copeland Creek	0.00			0.29				5.34	2.79	3.90	136.98	1779.60				42.80	1971.70	1.51
Flat Creek	0.00	3.99		9.93			61.54	29.40	29.70	21.57	174.33	4924.31	0.12	251.51	4.75	331.36	5842.51	0.37
Flat Shoals Creek								1.75	1.45	1.18	0.27	0.41				3.81	8.87	0.01
Fromby Creek	0.00			0.00				1.49	6.85	3.22	5.03	54.04		4.47	0.04	55.58	130.72	0.13
Gum Branch	0.00			0.20				6.76	0.59	1.46	93.92	2741.81				66.39	2911.13	3.33
Gum Creek	0.00			0.94				25.64	7.67	11.67	162.21	5,772.75	0.01			130.46	131.40	1.26
Hillabatchee Creek	0.00	1.82		1.28			1.30	169.81	52.94	56.56	230.26	10009.94				228.94	10752.85	0.76
Little Snake Creek	0.00	0.30		0.23			1.88	16.27	6.95	10.58	19.08	563.82	0.02			184.47	803.61	0.37
Long Cane Creek up U/S	0.00			0.19			2.34	3.11	1.93	2.89	31.22	1923.01		6.42		37.99	2009.10	0.58
Long Cane Creek up D/S	0.00			0.38			2.34	3.19	2.01	2.96	32.20	1964.17		6.77		43.21	2057.23	0.57
Norman Creek	0.00	0.34		0.14				5.96	5.21	3.93	28.22	805.59	0.00	0.09		92.82	942.30	0.51
Panther Creek upper	0.00						0.63	0.83	1.15	1.11	4.42	92.90		1.52		19.67	122.24	0.12
Polecat Creek	0.00	2.01	0.07	1.46				1.01	1.55	1.28	70.01	4408.01	1.33	7.44	0.09	59.62	4553.89	1.69
Red Oak Creek	0.00			0.29			1.30	34.46	11.11	12.41	74.94	4991.90				274.65	5401.06	1.53
Snake Creek upper	0.00	24.21	0.31	2.02			7.79	13.18	12.97	8.63	41.58	1745.32	0.30			235.56	2091.86	0.45
Snake Creek lower	0.00	73.89	0.37	5.84			159.31	135.69	81.95	68.58	252.08	10044.03	3.05	0.75		1465.52	12291.06	0.48
Town Creek lower	0.00			1.24			91.51	42.72	22.22	18.32	83.97	2918.20	0.79			157.17	3336.14	0.55
Trib to Whooping	0.00							1.59	0.93	1.36	10.16	167.59				60.64	242.27	0.53
Whooping Creek upper	0.00	9.30	0.03	1.34				11.46	5.60	6.42	56.18	2308.75	0.08	5.02		276.95	2681.13	0.83
Whooping Creek lower	0.00	17.39	0.04	4.59			2.56	83.22	39.14	48.25	331.80	12054.90	1.58	5.02		1168.86	13757.33	0.83
Wolf Creek	0.00	0.22		0.33				3.29	2.04	2.39	57.14	625.22				36.38	727.01	0.44

Table 21. Sediment Load Allocations (Unimpaired – Southeastern Plains Ecoregion)

	Sediment Load (tons/yr)																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road	Total	load (tons/acre/yr)
Cemochechbee Creek	0.00	1.29		0.94			29.24	33.92	26.76	32.78	21.04	13275.25	0.04	95.50	0.73	287.48	13804.99	0.87
Colochee/Frog Bottom	0.00	0.87		0.33			47.26	89.85	41.52	57.23	7.71	1367.00		78.02		1239.43	2929.22	0.33
Drag Nasty Creek	0.00			0.29			68.55	8.61	6.47	9.13	37.79	9314.63		113.12	0.21	275.22	9834.03	1.20
Flat Creek	0.00	0.11		0.86	0.00		49.46	10.99	8.39	11.67	84.27	19450.02	0.05	147.29	0.12	741.13	20504.37	1.21
Holanna Creek	0.00	7.93	0.04	1.27			171.02	59.64	74.46	62.71	26.26	15635.97	0.33	574.46	3.15	483.07	17100.32	0.71
Kirkland Creek	0.00			0.40			9.64	5.21	2.83	4.63	140.47	40591.49		188.79	2.75	847.44	41793.66	1.84
Kolomoki Creek	0.00	1.69	0.11	1.61			70.93	25.97	32.01	32.20	154.27	50446.11	0.25	266.05	2.55	1549.67	52583.40	1.43
Ochillee Creek	0.00	4.89	0.17	2.30			46.34	22.78	25.84	16.52	3.80		1.76	268.10	1.75	154.99	549.23	0.04
Pataula Creek	0.00	6.33	0.10	4.71			427.28	192.12	215.75	202.74	128.74	57503.78	0.84	2187.87	6.03	3541.25	64417.53	0.69
Pumpkin Creek	0.00	0.36		0.27			65.84	33.54	48.03	43.78	7.72	3935.96		164.01	0.98	922.97	5223.46	0.28
Sawhatchee Creek	0.00	0.38		0.30			9.24	4.14	1.29	2.71	64.65	11103.15	0.02	112.58	3.25	367.62	11669.31	1.13
Sawhatchee Creek	0.00	0.52		0.74			19.48	8.71	6.29	7.46	107.33	25089.76	0.02	357.23	4.61	1094.22	26696.38	1.11
Smithee Jack Creek	0.00	1.56		0.26			47.51	7.66	13.34	13.53	29.98	6753.25		124.34	0.34	74.96	7066.73	1.02
Tobannee Creek	0.00	0.18		0.18			15.21	3.18	8.60	7.66	32.59	3316.69	0.00	100.24		90.42	3574.95	0.92

Table 21. Sediment Load Allocations (Impaired – Piedmont Ecoregion)

	Sediment Load (tons/yr)																	
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road	Total	load (tons/acre/yr)
Anneewakee Creek	0.00	634.75	33.93	28.96	0.00	936.43	1.10	7.16	2.64	3.85	15.22	2693.46	14.59			600.31	4972.40	0.49
Blue John Creek upper	0.00	503.71	23.66	21.34				1.22	1.80	2.06	20.74	2805.70	23.05	0.07		396.68	3800.04	0.96
Blue John Creek lower	0.00	716.04	28.05	33.75			0.04	2.15	2.63	3.28	25.16	4326.10	35.35	0.07		565.78	5738.41	0.99
Cavender Creek								2.61	4.10	2.29	14.77	456.25				9.60	489.63	0.68
Flat Shoals Trib.	0.00			0.23				2.54	2.64	2.06	14.68	626.33				132.90	781.38	0.83
Hilly Mill Creek upper	0.00	0.58		0.26				13.22	5.14	8.01	38.11	2550.39				164.83	2780.53	0.79
Hilly Mill Creek	0.00	0.81		0.56			0.00	19.88	22.36	17.14	78.21	5139.40		10.83		259.08	5548.27	0.73
Long Branch	0.00			0.15				0.84	1.11	0.74	12.94	549.76		5.51	0.03	12.24	583.33	0.79
Long Cane Creek midupper	0.00	33.16	0.73	18.85		4775.55	6.38	15.36	11.98	13.77	122.72	9250.82	4.06	101.89	0.40	430.56	14786.23	0.93
Long Cane Creek midup	0.00	34.09	0.73	21.96		4775.55	6.38	20.11	17.18	19.62	171.08	13205.80	5.60	175.99	0.66	582.39	19037.15	0.95
Long Cane Creek middle	0.00	956.03	35.12	84.62		5692.66	13.15	32.20	28.53	32.39	247.13	21167.55	68.11	414.72	0.69	1486.93	30259.82	0.86
Long Cane Creek midlow	0.00	962.01	35.22	89.04		5692.66	29.33	40.88	34.71	38.65	293.85	24203.70	68.99	507.02	1.01	1759.33	33756.40	0.83
Long Cane Creek midlower	0.00	975.50	35.46	95.58		5692.66	32.23	48.19	42.06	46.18	365.38	27284.40	69.00	651.29	4.33	1955.92	37298.20	0.77
Long Cane Creek	0.00	991.82	35.51	97.39		5692.66	32.23	49.81	44.07	48.48	371.71	27417.76	69.63	671.21	5.36	2007.88	37535.54	0.75
Mineral Springs Branch up	0.00	193.35	5.02	0.88				0.51	0.28	0.65	7.03	146.11	7.59			107.61	469.02	0.62
Mineral Springs Branch down	0.00	288.10	8.18	5.94			0.00	0.82	0.60	1.23	8.21	285.12	10.22			152.85	761.26	0.62
Mt. Hope Branch	0.00			0.08				11.65	0.55	1.50	0.16	107.55				4.31	125.81	0.20
Ollie Branch	0.00			0.12			0.50	3.82	4.39	2.77	3.79	164.84		11.19	0.49	7.91	199.83	0.15
Panther Creek middle	0.00	8.06	0.04	0.17		4659.91	2.16	3.55	2.34	2.59	24.42	1853.44	0.48	12.05		71.41	6640.62	2.30
Panther Creek lower	0.00	8.06	0.04	2.91		4659.91	2.31	5.62	4.10	4.14	40.11	3438.50	0.48	16.37		111.06	8293.61	1.71
Piney Woods Creek	0.00			0.07			0.19	1.66	4.16	1.57	20.60	537.33		4.37		23.31	593.26	0.41
Shoal Creek	0.00	1.74	0.01	0.10				1.29	0.72	0.83	19.40	566.84	0.04	0.41		10.84	602.23	0.45
Snake Creek upper	0.00	173.01	4.44	12.59			0.01	0.47	0.64	0.70	0.00		7.81			117.12	316.78	0.34
Snake Creek	0.00	176.90	4.80	15.48			0.01	0.58	0.85	0.82	0.10		8.64			125.64	333.83	0.30
Town Creek	0.00			0.40			2.69	15.51	6.63	6.78	48.79	1528.34				5.60	1614.74	0.76
Wahoo Creek upper	0.00	348.70	14.39	27.51			0.02	1.78	1.58	2.03	0.70	198.33	13.63			263.93	872.61	0.34
Wahoo Creek middle	0.00	437.42	17.98	44.51			0.04	3.38	4.44	4.21	23.00	1354.14	21.59	8.08		387.57	2306.35	0.48
Wahoo Creek	0.00	759.78	23.43	68.23			0.15	10.39	11.07	11.17	139.09	5662.06	43.40	176.52	0.73	836.86	7742.89	0.61

Table 21. Sediment Load Allocations (Impaired – Southeastern Plain Ecoregion)

Sediment Load (tons/yr)																		
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road	Total	load (tons/acre/yr)
Black Creek	0.00	1.56		0.64			31.08	41.76	19.11	27.60	2.87	3182.02	0.10	107.36	0.58	382.20	3796.88	0.39
Bustahatchee Creek	0.00						31.85	28.21	43.37	49.59	9.04	795.08		24.22	7.69	302.13	1291.18	0.25
Coheelee Creek	0.00	0.15		0.39			9.64	3.73	4.48	5.76	49.13	17321.31		154.51	2.37	411.20	17962.66	1.38
Day Creek	0.00	0.04		0.46			94.84	25.02	55.07	42.18	6.45	3148.40		240.64	0.85	524.27	4138.21	0.40
Hitchitee Creek	0.00	48.03	4.73	19.08			104.51	78.99	30.53	45.35	6.25	4065.97	2.73	314.80	1.12	449.69	5171.80	0.21
Hodchodkee Creek up	0.00	22.51	1.94	3.99			54.68	37.12	21.90	21.69	15.69	8597.67	1.90	125.92	1.45	481.15	9387.60	1.05
Hodchodkee Creek low	0.00	61.38	4.25	6.36			220.99	108.59	175.89	141.73	53.24	31859.64	2.88	704.43	3.65	2145.14	35488.17	0.90
Hog Creek	0.00	7.64	0.04	0.47			21.28	24.28	17.02	27.96	6.06	5257.10	0.32	87.57	0.18	97.15	5547.07	0.59
Little Hitchitee Creek	0.00	0.24		0.09			4.78	11.15	3.31	5.56	1.61	357.76		113.91	0.88	55.86	555.16	0.12
Little Juniper Creek	0.00	0.16		0.04			52.93	5.17	2.78	3.50	1.14	1248.80		55.29	0.75	114.96	1485.52	0.27
Little Pine Knot Creek		0.86		1.07			3.07	12.12	2.56	4.27	0.84	150.79	0.28	55.82	0.11	40.33	272.11	0.07
Pataula Creek	0.00	4.17	0.10	1.39			11.94	16.90	6.21	8.47	23.80	5529.30	0.55	73.24	0.03	305.81	5981.90	1.20
Pine Knot Creek	0.00	2.50		0.65			215.42	22.00	16.16	17.87	8.71	6198.47	0.06	19.08		444.17	6945.09	0.39
Roaring Branch	0.00	0.04		0.33			9.95	5.28	6.49	9.40	56.58	8194.97		62.51	0.90	244.28	8590.75	1.69
Tiger Creek	0.00	191.60	12.23	4.54			0.73	1.73	1.83	3.15	1.17	296.21	1.59	9.94		100.37	625.10	0.24
Weaver Creek	0.00	0.03		0.11			3.13	1.07	0.95	0.83	13.32	2635.19		32.22	0.32	113.60	2800.79	1.02

Table 22. Sediment Load Percentages (Unimpaired – Piedmont Ecoregion)

	Percent Total Sediment Load															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Anneewakee Creek up	0.00%	12.92%	0.70%	0.57%	0.00%	19.23%	0.02%	0.14%	0.05%	0.07%	0.30%	53.68%	0.30%			12.01%
Anneewakee Creek low	0.00%	12.79%	0.66%	0.57%	0.00%	17.92%	0.02%	0.15%	0.05%	0.08%	0.33%	55.04%	0.28%			12.11%
Beech Creek	0.00%			0.04%			1.55%	1.30%	1.71%	1.20%	0.77%	58.94%		10.07%		24.42%
Big Branch	0.00%	0.19%		0.04%			0.17%	0.11%	0.22%	0.11%	1.19%	93.15%		2.90%	0.01%	1.90%
Blue John Creek middle	0.12%	18.77%	3.77%	5.90%				7.70%	11.55%	12.86%	5.46%	19.94%	6.12%	0.00%		7.79%
Copeland Creek	0.00%			0.01%				0.27%	0.14%	0.20%	6.95%	90.26%				2.17%
Flat Creek	0.00%	0.07%		0.17%			1.05%	0.50%	0.51%	0.37%	2.98%	84.28%	0.00%	4.30%	0.08%	5.67%
Flat Shoals Creek								19.77%	16.33%	13.29%	3.03%	4.64%				42.94%
Fromby Creek	0.00%			0.00%				1.14%	5.24%	2.47%	3.85%	41.34%		3.42%	0.03%	42.52%
Gum Branch	0.00%			0.01%				0.23%	0.02%	0.05%	3.23%	94.18%				2.28%
Gum Creek	0.00%			0.02%				0.42%	0.13%	0.19%	2.65%	94.46%	0.00%			2.13%
Hillabatchee Creek	0.00%	0.02%		0.01%			0.01%	1.58%	0.49%	0.53%	2.14%	93.09%				2.13%
Little Snake Creek	0.00%	0.04%		0.03%			0.23%	2.02%	0.86%	1.32%	2.37%	70.16%	0.00%			22.96%
Long Cane Creek up U/S	0.00%			0.01%			0.12%	0.15%	0.10%	0.14%	1.55%	95.71%		0.32%		1.89%
Long Cane Creek up D/S	0.00%			0.02%			0.11%	0.16%	0.10%	0.14%	1.57%	95.48%		0.33%		2.10%
Norman Creek	0.00%	0.04%		0.02%				0.63%	0.55%	0.42%	3.00%	85.49%	0.00%	0.01%		9.85%
Panther Creek upper	0.00%						0.51%	0.68%	0.94%	0.91%	3.62%	76.00%		1.24%		16.09%
Polecat Creek	0.00%	0.04%	0.00%	0.03%				0.02%	0.03%	0.03%	1.54%	96.80%	0.03%	0.16%	0.00%	1.31%
Red Oak Creek	0.00%			0.01%			0.02%	0.64%	0.21%	0.23%	1.39%	92.42%				5.09%
Snake Creek upper	0.00%	1.16%	0.01%	0.10%			0.37%	0.63%	0.62%	0.41%	1.99%	83.43%	0.01%			11.26%
Snake Creek lower	0.00%	0.60%	0.00%	0.05%			1.30%	1.10%	0.67%	0.56%	2.05%	81.72%	0.02%	0.01%		11.92%
Town Creek lower	0.00%			0.04%			2.74%	1.28%	0.67%	0.55%	2.52%	87.47%	0.02%			4.71%
Trib to Whooping	0.00%							0.66%	0.39%	0.56%	4.19%	69.17%				25.03%
Whooping Creek upper	0.00%	0.35%	0.00%	0.05%				0.43%	0.21%	0.24%	2.10%	86.11%	0.00%	0.19%		10.33%
Whooping Creek lower	0.00%	0.13%	0.00%	0.03%			0.02%	0.60%	0.28%	0.35%	2.41%	87.63%	0.01%	0.04%		8.50%
Wolf Creek	0.00%	0.03%		0.05%				0.45%	0.28%	0.33%	7.86%	86.00%				5.00%

Table 22. Sediment Load Percentages (Unimpaired – Southeastern Plains Ecoregion)

Percent Total Sediment Load																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Cemochechbee Creek	0.00%	0.01%		0.01%			0.21%	0.25%	0.19%	0.24%	0.15%	96.16%	0.00%	0.69%	0.01%	2.08%
Colochee/Frog Bottom	0.00%	0.03%		0.01%			1.61%	3.07%	1.42%	1.95%	0.26%	46.67%		2.66%		42.31%
Drag Nasty Creek	0.00%			0.00%			0.70%	0.09%	0.07%	0.09%	0.38%	94.72%		1.15%	0.00%	2.80%
Flat Creek	0.00%	0.00%		0.00%	0.00%		0.24%	0.05%	0.04%	0.06%	0.41%	94.86%	0.00%	0.72%	0.00%	3.61%
Holanna Creek	0.00%	0.05%	0.00%	0.01%			1.00%	0.35%	0.44%	0.37%	0.15%	91.44%	0.00%	3.36%	0.02%	2.82%
Kirkland Creek	0.00%			0.00%			0.02%	0.01%	0.01%	0.01%	0.34%	97.12%		0.45%	0.01%	2.03%
Kolomoki Creek	0.00%	0.00%	0.00%	0.00%			0.13%	0.05%	0.06%	0.06%	0.29%	95.94%	0.00%	0.51%	0.00%	2.95%
Ochillee Creek	0.00%	0.89%	0.03%	0.42%			8.44%	4.15%	4.70%	3.01%	0.69%		0.32%	48.81%	0.32%	28.22%
Pataula Creek	0.00%	0.01%	0.00%	0.01%			0.66%	0.30%	0.33%	0.31%	0.20%	89.27%	0.00%	3.40%	0.01%	5.50%
Pumpkin Creek	0.00%	0.01%		0.01%			1.26%	0.64%	0.92%	0.84%	0.15%	75.35%		3.14%	0.02%	17.67%
Sawhatchee Creek	0.00%	0.00%		0.00%			0.08%	0.04%	0.01%	0.02%	0.55%	95.15%	0.00%	0.96%	0.03%	3.15%
Sawhatchee Creek	0.00%	0.00%		0.00%			0.07%	0.03%	0.02%	0.03%	0.40%	93.98%	0.00%	1.34%	0.02%	4.10%
Smithee Jack Creek	0.00%	0.02%		0.00%			0.67%	0.11%	0.19%	0.19%	0.42%	95.56%		1.76%	0.00%	1.06%
Tobannee Creek	0.00%	0.01%		0.00%			0.43%	0.09%	0.24%	0.21%	0.91%	92.78%	0.00%	2.80%		2.53%

Table 22. Sediment Load Percentages (Impaired – Piedmont Ecoregion)

	Percent Total Sediment Load															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Anneewakee Creek	0.00%	12.77%	0.68%	0.58%	0.00%	18.83%	0.02%	0.14%	0.05%	0.08%	0.31%	54.17%	0.29%			12.07%
Blue John Creek upper	0.00%	13.26%	0.62%	0.56%				0.03%	0.05%	0.05%	0.55%	73.83%	0.61%	0.00%		10.44%
Blue John Creek lower	0.00%	12.48%	0.49%	0.59%			0.00%	0.04%	0.05%	0.06%	0.44%	75.39%	0.62%	0.00%		9.86%
Cavender Creek								0.53%	0.84%	0.47%	3.02%	93.18%				1.96%
Flat Shoals Trib.	0.00%			0.03%				0.32%	0.34%	0.26%	1.88%	80.16%				17.01%
Hilly Mill Creek upper	0.00%	0.02%		0.01%				0.48%	0.18%	0.29%	1.37%	91.72%				5.93%
Hilly Mill Creek	0.00%	0.01%		0.01%			0.00%	0.36%	0.40%	0.31%	1.41%	92.63%		0.20%		4.67%
Long Branch	0.00%			0.03%				0.14%	0.19%	0.13%	2.22%	94.25%		0.94%	0.00%	2.10%
Long Cane Creek midupper	0.00%	0.22%	0.00%	0.13%		32.30%	0.04%	0.10%	0.08%	0.09%	0.83%	62.56%	0.03%	0.69%	0.00%	2.91%
Long Cane Creek midup	0.00%	0.18%	0.00%	0.12%		25.09%	0.03%	0.11%	0.09%	0.10%	0.90%	69.37%	0.03%	0.92%	0.00%	3.06%
Long Cane Creek middle	0.00%	3.16%	0.12%	0.28%		18.81%	0.04%	0.11%	0.09%	0.11%	0.82%	69.95%	0.23%	1.37%	0.00%	4.91%
Long Cane Creek midlow	0.00%	2.85%	0.10%	0.26%		16.86%	0.09%	0.12%	0.10%	0.11%	0.87%	71.70%	0.20%	1.50%	0.00%	5.21%
Long Cane Creek midlower	0.00%	2.62%	0.10%	0.26%		15.26%	0.09%	0.13%	0.11%	0.12%	0.98%	73.15%	0.19%	1.75%	0.01%	5.24%
Long Cane Creek	0.00%	2.64%	0.09%	0.26%		15.17%	0.09%	0.13%	0.12%	0.13%	0.99%	73.04%	0.19%	1.79%	0.01%	5.35%
Mineral Springs Branch up	0.00%	41.22%	1.07%	0.19%				0.11%	0.06%	0.14%	1.50%	31.15%	1.62%			22.94%
Mineral Springs Branch down	0.00%	37.85%	1.07%	0.78%			0.00%	0.11%	0.08%	0.16%	1.08%	37.45%	1.34%			20.08%
Mt. Hope Branch	0.00%			0.07%				9.26%	0.44%	1.19%	0.13%	85.49%				3.43%
Ollie Branch	0.00%			0.06%			0.25%	1.91%	2.20%	1.39%	1.90%	82.49%		5.60%	0.25%	3.96%
Panther Creek middle	0.00%	0.12%	0.00%	0.00%		70.17%	0.03%	0.05%	0.04%	0.04%	0.37%	27.91%	0.01%	0.18%		1.08%
Panther Creek lower	0.00%	0.10%	0.00%	0.04%		56.19%	0.03%	0.07%	0.05%	0.05%	0.48%	41.46%	0.01%	0.20%		1.34%
Piney Woods Creek	0.00%			0.01%			0.03%	0.28%	0.70%	0.27%	3.47%	90.57%		0.74%		3.93%
Shoal Creek	0.00%	0.29%	0.00%	0.02%				0.21%	0.12%	0.14%	3.22%	94.12%	0.01%	0.07%		1.80%
Snake Creek upper	0.00%	54.61%	1.40%	3.97%			0.00%	0.15%	0.20%	0.22%	0.00%		2.46%			36.97%
Snake Creek	0.00%	52.99%	1.44%	4.64%			0.00%	0.17%	0.25%	0.25%	0.03%		2.59%			37.64%
Town Creek	0.00%			0.03%			0.17%	0.96%	0.41%	0.42%	3.02%	94.65%				0.35%
Wahoo Creek upper	0.00%	39.96%	1.65%	3.15%			0.00%	0.20%	0.18%	0.23%	0.08%	22.73%	1.56%			30.25%
Wahoo Creek middle	0.00%	18.97%	0.78%	1.93%			0.00%	0.15%	0.19%	0.18%	1.00%	58.71%	0.94%	0.35%		16.80%
Wahoo Creek	0.00%	9.81%	0.30%	0.88%			0.00%	0.13%	0.14%	0.14%	1.80%	73.13%	0.56%	2.28%	0.01%	10.81%

Table 22. Sediment Load Percentages (Impaired – Southeastern Plains Ecoregion)

Percent Total Sediment Load																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Black Creek	0.00%	0.04%		0.02%			0.82%	1.10%	0.50%	0.73%	0.08%	83.81%	0.00%	2.83%	0.02%	10.07%
Bustahatchee Creek	0.00%						2.47%	2.18%	3.36%	3.84%	0.70%	61.58%		1.88%	0.60%	23.40%
Coheelee Creek	0.00%	0.00%		0.00%			0.05%	0.02%	0.02%	0.03%	0.27%	96.43%		0.86%	0.01%	2.29%
Day Creek	0.00%	0.00%		0.01%			2.29%	0.60%	1.33%	1.02%	0.16%	76.08%		5.81%	0.02%	12.67%
Hitchitee Creek	0.00%	0.93%	0.09%	0.37%			2.02%	1.53%	0.59%	0.88%	0.12%	78.62%	0.05%	6.09%	0.02%	8.70%
Hodchodkee Creek up	0.00%	0.24%	0.02%	0.04%			0.58%	0.40%	0.23%	0.23%	0.17%	91.59%	0.02%	1.34%	0.02%	5.13%
Hodchodkee Creek low	0.00%	0.17%	0.01%	0.02%			0.62%	0.31%	0.50%	0.40%	0.15%	89.78%	0.01%	1.98%	0.01%	6.04%
Hog Creek	0.00%	0.14%	0.00%	0.01%			0.38%	0.44%	0.31%	0.50%	0.11%	94.77%	0.01%	1.58%	0.00%	1.75%
Little Hitchitee Creek	0.00%	0.04%		0.02%			0.86%	2.01%	0.60%	1.00%	0.29%	64.44%		20.52%	0.16%	10.06%
Little Juniper Creek	0.00%	0.01%		0.00%			3.56%	0.35%	0.19%	0.24%	0.08%	84.07%		3.72%	0.05%	7.74%
Little Pine Knot Creek		0.31%		0.39%			1.13%	4.45%	0.94%	1.57%	0.31%	55.42%	0.10%	20.51%	0.04%	14.82%
Pataula Creek	0.00%	0.07%	0.00%	0.02%			0.20%	0.28%	0.10%	0.14%	0.40%	92.43%	0.01%	1.22%	0.00%	5.11%
Pine Knot Creek	0.00%	0.04%		0.01%			3.10%	0.32%	0.23%	0.26%	0.13%	89.25%	0.00%	0.27%		6.40%
Roaring Branch	0.00%	0.00%		0.00%			0.12%	0.06%	0.08%	0.11%	0.66%	95.39%		0.73%	0.01%	2.84%
Tiger Creek	0.00%	30.65%	1.96%	0.73%			0.12%	0.28%	0.29%	0.50%	0.19%	47.39%	0.25%	1.59%		16.06%
Weaver Creek	0.00%	0.00%		0.00%			0.11%	0.04%	0.03%	0.03%	0.48%	94.09%		1.15%	0.01%	4.06%

farmland. With the reduction in farmland, there has also been a decrease in the amount of soil erosion. This suggests that the sedimentation observed in the impaired stream segments may be legacy sediment resulting from past land use practices. It is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

5.3 Seasonal Variation

Sediment is expected to fluctuate according to the amount and distribution of rainfall. Since rainfall is greatest in the spring and winter seasons, it is expected that sediment loadings would be highest during these seasons. However, these seasonal fluctuations and other short-term variability in loadings due to episodic events is usually evened out by the response of the biological community to habitat alteration, a long-term process. Therefore, the average annual sediment load was considered to be an adequate indicator of potential stream impairment due to sediment.

5.4 Margin of Safety

The MOS is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) Implicitly incorporate the MOS using conservative model assumptions to develop allocations; or 2) Explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this TMDL, the MOS was implicitly incorporated in the use of conservative modeling assumptions, including the selection of average USLE factors and the use of no conservation practices (P factor = 1.0) for all land uses. In addition, average reference watershed sediment loading rates were used for the numeric targets.

5.5 Total Sediment Load

The average sediment loads of the reference watersheds in the Piedmont and Southeastern Plains ecoregions within the Chattahoochee and Flint River basins are 0.63 tons/acre/yr (ranging from 0.30 to 1.26 tons/acre/yr) and 1.10 tons/acre/yr (ranging from 0.28 to 1.84 tons/acre/yr), respectively. The total maximum daily load of sediment was determined by adding the WLA and the LA. The MOS, as described above, was implicitly included in the TMDL analysis and does not factor directly in the TMDL equation. The annual average sediment loads for each of the impaired watersheds are summarized in Table 23 and includes any required sediment load reduction. A Summary Memorandum for each watershed is provided in Appendix A.

The USLE method used indicates that the largest sediment loads come from areas with close proximity to the stream grid, especially dirt roads and croplands. The model does not account for any BMPs that are currently being used to control erosion from these areas., and thus may over estimate some sediment loads.

The sediment load calculated for Carr Creek (4.84 ton tons/acre/yr) is high. This is due to the high C factor used for quarries, strip mines and gravel pits, and thus the large contribution of sediment (94.67 percent) from this land use. The Athens Quarry, owned by Hanson Aggregates, mines stone granite within this watershed. The sediment load from stone and gravel mines is typically low. It is believed the C factor used in the USLE for stone quarries was too high and thus, the sediment load was over estimated.

Table 23. Annual Average Sediment Loads and the Required Sediment Load Reductions

Name	Current Load (tons/yr)	WLA (tons/yr)	LA (tons/yr)	Total Load (tons/yr)	% Reduction
Anneewakee Creek	5,121	148.4	4972	5,121	0%
Cavender Creek	490		454	454	7%
Flat Shoals Trib.	781		590	590	25%
Hilly Mill Creek	5,548		4,758	4,758	14%
Long Branch	583		463	463	21%
Long Cane Creek	37,628	92.8	31361	31,454	16%
Mineral Springs Branch upper	469		469	469	0%
Mineral Springs Branch down	816	54.9	718	773	5%
Mt. Hope Branch	126		126	126	0%
Ollie Branch	200		200	200	0%
Piney Woods Creek	593		593	593	0%
Shoal Creek	602		602	602	0%
Snake Creek	334		334	334	0%
Town Creek	1,615		1,345	1,345	17%
Wahoo Creek	7,880	137.0	7743	7,880	0%
Black Creek	3,797		3,797	3,797	0%
Bustahatchee Creek	1,291		1,291	1,291	0%
Coheelee Creek	17,963		14,358	14,358	20%
Day Creek	4,138		4,138	4,138	0%
Hitchitee Creek	5,172		5,172	5,172	0%
Hodchodkee Creek upper	9,415	27.4	9388	9,415	0%
Hodchodkee Creek lower	35,516	27.4	35488	35,516	0%
Hog Creek	5,548	1.4	5547	5,548	0%
Little Hitchitee Creek	555		555	555	0%
Little Juniper Creek	1,486		1,486	1,486	0%
Little Pine Knot Creek	272		272	272	0%
Pataula Creek	5,982		5,482	5,482	8%
Pine Knot Creek	6,945		6,945	6,945	0%
Roaring Branch	8,591		5,578	5,578	35%
Tiger Creek	625		625	625	0%
Weaver Creek	2,801		2,801	2,801	0%

6.0 RECOMMENDATIONS

6.1 Monitoring

Water quality monitoring is conducted at a number of locations across the State each year. GAEPD has adopted a basin approach to water quality management; an approach that divides Georgia's major river basins into five groups. This approach provides for additional monitoring to be focused on one of the five basin groups each year. The Chattahoochee River Basin along with the Flint River Basin were the basins of focused monitoring in 2000 and will again receive focused monitoring in 2005. Focused basin monitoring is to continue to monitor 303(d) listed waters. Therefore, additional monitoring of these streams will be initiated, as appropriate, during the next monitoring cycle to determine if there has been improvement in the biological communities.

6.2 Sediment Management Practices

Based on the findings of the source assessment, it was determined that most of the sediment found in the Chattahoochee River Basin streams is due to past land use practices and is referred to as "legacy" sediment. Therefore, it is recommended that there be no net increase in sediment delivered to the impaired stream segments, in order that these streams recover over time.

The measurement of sediment delivered to a stream is difficult, if not impossible, to determine. Therefore, setting a numeric TMDL may be ineffective given the difficulty in measuring it. In addition, habitat and aquatic communities are usually slow to respond, which is why monitoring will continue according to the five-year monitoring cycle. Thus, this TMDL recommends the compliance with NPDES permits and the implementation of BMPs. The effects of compliance with NPDES permits and implementation of BMPs will contribute to the improvement of stream habitats and water quality, and will represent a beneficial measure of TMDL implementation.

Management practices recommended include:

- Compliance with NPDES permit limits and requirements
- Implementation of GFC Best Management Practices for forestry
- Adoption of NRCS Conservation Practices
- Adherence to the Mined Land Use Plan prepared as part of the Surface Mining Permit Application
- Adoption of proper unpaved road maintenance practices
- Implementation of Erosion and Sedimentation Control Plans for land disturbing activities
- Mitigation and prevention of stream bank erosion due to increased streamflow velocities caused by urban runoff

6.2.1 Point Source Approaches

Point sources are defined as discharges of treated wastewater or storm water into rivers and streams at discrete locations. Treated wastewater tends to be discharged at relatively stable rates; whereas, storm water is discharged at irregular, intermittent rates, depending on precipitation and runoff. The NPDES permit program provides a basis for municipal, industrial

and storm water permits, monitoring and compliance with limitations, and appropriate enforcement actions for violations.

In accordance with GAEPD rules and regulations, all NPDES dischargers in the watershed are required to meet their current NPDES permit limits. It is recommended that there be no authorized increase in the mass loading of sediment (TSS) above those in the current NPDES permits, in order to maintain the current sediment loads in the impaired streams. The removal of mined material involves water pumped from the mine pit, and mineral processing involves the disposal of process waters. These waters are treated through either sedimentation ponds or detention basins prior to being discharged to the stream and are regulated by NPDES permits. For mining facilities located within the impaired watersheds, it is recommended that monitoring frequencies be increased in order to better characterize the total annual sediment loads coming from these facilities.

Georgia EPD has developed a General Storm Water NPDES Permit for Construction Activities. The current permit is required for all construction sites disturbing five or more acres. In 2003, this permit will cover all construction sites disturbing one or more acres. All sites required to have this permit are authorized to discharge storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through VII of the Georgia Storm Water Permit. The permit requires all sites to have an Erosion and Sedimentation Control Plan; to implement, inspect and maintain BMPs; and to monitor storm water for turbidity. Georgia's General Storm Water Permit can be considered a water quality-based permit, in that the numeric limits in the permit, if met and enforced, will not cause a water quality problem.

It is recommended that construction sites within impaired watersheds that are located within 100 feet of the impaired stream or its tributaries use DIRT II techniques to model and manage storm water runoff from these sites. In addition, all construction sites will monitor their storm water runoff as required by the General Storm Water NPDES Permit for Construction Activities.

6.2.2 Nonpoint Source Land Use Approaches

The Georgia EPD is responsible for administering and enforcing laws to protect the waters of the State. EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities include establishing water quality standards and use classifications, assessing and reporting water quality conditions, issuing point source permits, issuing water withdrawal and ground water permits, and regulating land-disturbing activities. Georgia is working with local governments, and agricultural and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission to foster the implementation of best management practices that address nonpoint source pollution. In addition, public education efforts are being targeted at individual stakeholders to provide information regarding the use of best management practices to protect water quality. The following sections describe in more detail the specific measures to reduce nonpoint sources of sediment by land use type.

6.2.2.1 Forested Land

In 1978, EPD designated the Georgia Forestry Commission (GFC) to be the lead agency in managing and implementing the silvicultural portion of Georgia's Nonpoint Source Management Program. The GFC is responsible for coordinating water quality issues with regard to forested land in Georgia. The GFC is basically responsible for:

- Developing Best Management Practices (BMPs) for the forestry industry,
- Educating the forestry community on BMPs, and
- Conducting site inspections for compliance with the established BMPs.

The GFC formed a Forestry Nonpoint Source Pollution Technical Task Force to assess the extent of water pollution caused by forestry practices, and develop recommendations to reduce or eliminate erosion and sedimentation. After a three-year field study, the task force developed a set of BMPs that address all aspects of silviculture including forest road construction, timber harvesting, site preparation, and forest regeneration. The task force recommended the BMPs be implemented through a voluntary program, exempt from permitting under the Georgia Erosion and Sedimentation Control Act, emphasizing educational and training programs instead. In 1997, the original BMP document was revised to incorporate the 1989 Wetland BMP manual developed by the Georgia Forestry Association. The current BMP manual, *Georgia's Best Management Practices for Forestry,* was developed and became effective June 1, 1999 (GAEPD, 1999).

It is the responsibility of the GFC to educate and inform the forest community (landowners, procurement and land management foresters, consulting foresters, loggers, site prep and tree planting contractors) on the importance of BMPs. The GFC statewide coordinator and the twelve district coordinators conduct the educational programs across the state. The district coordinators receive specialized training in erosion and sediment control, forest road layout and construction, stream habitat assessment, rapid bioassessment (macroinvertebrate) monitoring, wetland delineation, and fluvial geomorphology. The GFC has developed training videos, slide programs, tabletop exhibits, and BMP billboards that are displayed at wood yards across the state. For the benefit of private landowners selling timber, the GFC has developed a Sample Forest Products Sale Agreement, which includes fill-in-the-blank spaces for specific BMP incorporation. Since December 1995, the GFC has been cooperating with the University of Georgia School of Forest Resources, the Georgia Forestry Association, and the American Forest and Paper Association (AFPA) member companies in the ongoing education of loggers and timber buyers through the Sustainable Forestry Initiative (SFI) Master Timber Harvester program. This includes an intensive training session on the BMPs conducted by the GFC.

To determine if educational efforts have been successful and if the BMPs are effective at minimizing erosion and sedimentation, the GFC conducted BMP compliance surveys in 1991 and 1992. In 1998, another BMP survey was conducted using a newly developed and more rigorous protocol recommended by a Southern Group of State Foresters (SGSF) Task Force. The GFC sampled about 10 percent of the forestry operations that occur annually. The number of samples taken in each county was based on the volume of wood harvested as reported in the state's latest Product Drain Report. Sites were randomly selected to reflect various forest types (non-industrial private forest, forest industry, and publicly owned lands). The survey results show that of the number of acres evaluated, the number in BMP compliance for the most part was very good. In 1991, approximately 86 percent of the acres evaluated were in compliance. In 1992, the figure increased to 92 percent compliance and in 1998, compliance rose to 98 percent.

The GFC also investigates and mediates complaints or concerns involving forestry operations on behalf of the EPD and the Army Corps of Engineers (COE) when stream water quality and wetlands are involved, respectively. Complaints from citizens are received, particularly in counties growing in population where landowners are living close to commercial forestry operations. After notifying the forest owner, the GFC District Coordinator conducts a field inspection to determine if BMPs were followed, if the potential for water quality problems exists, and the identity of the responsible party. If the complaint is valid, GFC will work with the

responsible party until the problem is corrected. However, the GFC has no regulatory authority. In situations where the GFC can not get satisfactory compliance, the case is turned over to Georgia EPD or COE for enforcement actions under the Georgia Water Quality Control Act or Section 404 of the Federal Clean Water Act.

It is recommended that the GFC continue to encourage BMP implementation, educational training programs, and site compliance surveys. The numbers of individuals trained and site compliance inspections should be recorded each year. In addition, the number of complaints received, the actions taken, and enforcement actions written should be recorded.

6.2.2.2 Agricultural Land

There are a number of agricultural organizations that work to support Georgia's more than 40,000 farmers. The following three organizations have primary responsibility for working with farmers to promote soil and water conservation:

- The University of Georgia - Cooperative Extension Service
- Georgia Soil and Water Conservation Commission
- Natural Resources Conservation Service

The University of Georgia (UGA) has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality. These include classroom instruction, basic and applied research, consulting assistance, and information on nonpoint source water quality impacts.

The Georgia Soil and Water Conservation Commission (GSWCC) was created in 1937 by a Georgia Legislative Act. In 1977, Georgia EPD designated the GSWCC as the lead agency for agricultural Nonpoint Source Management in the State. The GSWCC develops nonpoint source management programs and conducts educational activities to promote conservation and protection of land and water devoted to agricultural uses. In September 1994, the GSWCC developed a BMP manual, *Agricultural Best Management Practices for Protection of Water Quality in Georgia,* for the agricultural community (GSWCC, 1994).

The Natural Resources Conservation Service (NRCS) cooperates with Federal, State, and local governments to provide financial and technical assistance to farmers. NRCS develops standards and specifications for BMPs that are to be used to improve, protect, or maintain our State's natural resources. Practice standards establish the minimum level of acceptable quality for planning, designing, installing, operating, and maintaining BMPs. Practice specifications describe the technical details and workmanship required to install a BMP and the quality and extent of materials to be used in a BMP.

The NRCS provides Conservation Practice Standards and Job Sheets on their website (www.ga.nrcs.usda.gov/ga/gapas/FOTG/Section _4/). Some of these BMPs may be used for farming operations to reduce soil erosion. It is recommended that the agricultural communities with crop land close to impaired streams, and pasture land where grazing animals have access to the stream, investigate the various BMPs available to them in order to reduce soil erosion and bank collapse.

The 1996 Farm Bill and PL83-566 Small Watershed Program provided new financial assistance programs to address high priority environmental protection goals. Some programs that specifically address erosion and sedimentation are:

- The Environmental Quality Incentives Program
- Conservation Reserve Program
- Small Watershed Program

The Environmental Quality Incentives Program (EQIP) is a USDA cost-share program available to farmers to address natural resource problems. EQIP offers financial, educational, and technical assistance funding for installing BMPs that reduce soil erosion, improve water quality, or enhance wildlife habitats.

The Conservation Reserve Program (CRP) was originally designed to provide incentive and offer assistance to farmers to convert highly erodible and other environmentally sensitive land normally devoted to crop production into land with other long-term resource-conserving cover. CRP has been expanded to place eligible acreage into filter strips, riparian buffers, grassed waterways, or contour grass strips. Each of these practices helps to reduce erosion and sedimentation and improve water quality.

The Small Watershed Program provides financial and technical assistance funding for the installation of BMPs in watersheds less than 250,000 acres. This program is used to augment ongoing conservation programs where serious natural resource degradation has or is occurring. Agricultural water management, which includes projects that reduce soil erosion and sedimentation and improve water quality, is one of the eligible purposes of this program. NRCS is authorized by Public Law 83-566 to conduct river basin surveys and investigations. The NRCS River Basin Planning Program is designed to collect data on natural resource conditions within river basins of focus. NRCS is providing technical assistance to the GSWCC and the GA EPD with the Georgia River Basin Planning Program. Planning activities associated with this program will describe conditions of the agricultural natural resource base once every five years.

Every five years, the USDA Natural Resources Conservation Service conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends, covering non-federal land in the United States. The National Resources Inventory found the total wind and water erosion on cropland and Conservation Reserve Program land in Georgia declined 38 percent from 3.1 billion tons per year in 1982 to 1.9 billion tons in 1997 (USDA NRCS, 1998).

NRCS also provides a web-based database application (Performance and Results Measurement System, PRMS) so that conservation partners and the public can gain fast and easy access to the accomplishments and the progress made toward strategies and performance goals. The web site is http://sugarberry.itc.nrcs.usda.gov/Netdynamics/deeds/index.html.

It is recommended that the GSWCC and the NRCS continue to encourage BMP implementation, education efforts, and river basin surveys with regard to River Basin Planning. The five year National Resources Inventory should be continued and GAEPD supports the PRMS website.

6.2.2.3 Mine Sites

Surface mining and mineral processing present two threats to surface waters. The first threat is the wastewater from mining and mineral processing operations. These discharges are considered point sources and therefore are regulated by NPDES permits and were discussed in Section 6.2.1 above. The second threat involves mine reclamation activities. Reclamation occurs throughout the mining operation. From the first cut to the last, overburden is moved twice. With each movement of the soil and rock debris, the overburden must be managed to prevent soil and mineral erosion. Until the mine is re-vegetated, and hence reclaimed, BMPs must be implemented to prevent nonpoint source pollution.

The Georgia Surface Mining Act of 1968 provides for the issuance of mining permits at the discretion of the Director of Georgia EPD. These permits are administered by the Land Protection Branch. The surface mining permit application must include a Mined Land Use Plan, reclamation strategies, and surety bond requirements to guarantee proper management and reclamation of surface mined areas. The Mined Land Use Plan specifies activities prior to, during, and following mining to dispose of refuse and control erosion and sedimentation. The reclamation strategy includes the use of operational BMPs and procedures. The BMPs used are drawn from *the Manual for Erosion and Sedimentation Control in Georgia*, *Georgia's Best Management Practices for Forestry*, and from other states. Thus, the issuance of a surface mining permit in effect addresses BMPs to control nonpoint source pollutants. The regional EPD offices monitor and inspect surface mining sites to assess permit compliance.

It is recommended that special attention be given to those facilities located in impaired watersheds. The implementation and maintenance of BMPs used to control erosion should be reviewed during the site inspections.

The Georgia Mining Association (GMA) is an informal trade association of the mining industry. It serves more than 200 members, 47 mining companies and over 150 associate companies. The association monitors legislative developments and coordinates industry response. It educates miners about laws and regulations that affect them and provides a forum for the exchange of ideas. Through its newsletters, seminars, workshops, and annual conventions, the Georgia Mining Association serves as a source for mining industry information. It has several committees, including the Environmental Committee, that meet three to four times a year. The mining industry is conducting informal discussions on the potential of developing industry-wide standards for BMPs to prevent and reduce nonpoint source pollution. If these standards are adopted, the mining industry would likely conduct demonstration projects to gauge the effectiveness of the BMPs.

6.2.2.4 Roads

Unpaved roads can be a major contributor of sediment to our waterways if not properly managed. The following guidance for the maintenance and service of unpaved roadways, drainage ditches, and culverts can be used to minimize roadway erosion. One publication that may include some additional guidance is *Recommended Practices Manual, A Guideline for Maintenance and Service of Unpaved Roads* (Choctawhatchee, et. al, 2000).

Disturbances to unpaved roadway surfaces and ditches, and poor road surface drainage, results in deterioration of the road surface. This leads to increased roadway erosion and thus stream sedimentation. Unpaved roads are typically maintained by the blading and/or scraping of the roads to remove loose material. Proper, timely, and selective surface maintenance can prevent and minimize erosion of unpaved roadways. This in turn lengthens the life of the road and reduces maintenance costs. Roadway blading that occurs during periods when there is

enough moisture content allows for immediate re-compaction. In addition, roadwork performed near streams or stream-crossings during "dry" months of the year can reduce the amount of sediment that enters a stream.

Roadside ditches convey storm water runoff to an outlet. A good drainage ditch is shaped and lined with appropriate vegetative or structural material. A well-vegetated ditch slows, controls and filters the storm water runoff, providing an opportunity for sediments to be removed from the runoff before it enters surface waters. Energy dissipating structures to reduce velocity and dissipate turbulence in ditches are often necessary. Efficient disposal of runoff from the road helps preserve the roadbed and banks. Properly installed "turn-outs", or intermittent discharge points, help to maintain a stable velocity and proper flow capacity within the ditch by timely outleting water from them. This in turns alleviates roadway flooding, erosion, and maintenance problems. Properly placed "turn-outs" distribute roadway runoff and sediment over a larger vegetative filtering area, helping to reduce road side ditch maintenance to remove accumulated sediment.

Culverts are conduits used to convey water from one side of a road to another. Installation, modification, and/or improvements of culverts when streamflows and expected rainfall is low can reduce the amount of sediment that enters a stream. If the entire installation process, from beginning to end, can be completed before the next rainfall event, stream sedimentation can be minimized. Diverting all existing or potential streamflows while the culvert is being installed can also help reduce or avoid sedimentation below the installation. The culvert design can have a significant impact on the biological community if the size and species of fish passing through it are not considered. Changes in water velocities and the creation of vertical barriers also effect the biological communities.

6.2.2.5 Urban Development

The Erosion and Sedimentation Act, established in 1975, provides the mechanism for controlling erosion and sedimentation from land-disturbing activities. This Act establishes a permitting process for land-disturbing activities. Many local governments and counties have adapted erosion and sedimentation ordinances and have been given authority to issue and enforce permits for land-disturbing activities. Approximately 32 counties and 240 municipalities in Georgia have been certified as the local issuing authority. In areas where local governments have not been certified as an issuing authority, the Georgia EPD is responsible for permitting, inspecting, and enforcing the Erosion and Sedimentation Act.

To receive a land-disturbing permit, an applicant must submit an erosion and sedimentation control plan that incorporates specific conservation and engineering BMPs. The *Field Manual for Erosion and Sediment Control in Georgia,* developed by the State Soil and Water Conservation Commission, may be used as a guide to develop erosion and sedimentation control plans (GSWCC, 1997).

Local governments, with oversight by the Georgia EPD, and the Soil and Water Conservation Districts, are primarily responsible for implementing the Erosion and Sedimentation Act. Reports of suspected violations are made to the agency that issued the permit. In cases with local issuing authority, if the violation continues, the compliant is referred to the appropriate Soil and Water Conservation District. If the situation remains unresolved, the compliant is then referred to Georgia EPD for enforcement action. Enforcement may include administrative orders, injunctions, and civil penalties. It is recommended that the local and state governments continue to work to implement the provisions of the revised June 2001 Erosion and Sedimentation Act across Georgia.

Storm water runoff from developed urban areas (post-construction) can also have an impact on the transport of sediment to and within streams. Urbanization increases imperviousness, resulting in an increase in the volume of runoff that enters the streams. In addition, the streamflow rates may increase significantly from pre-construction rates. These changes in the streamflow can result in stream bank erosion and stream bottom down cutting. It is recommended that local governments review and consider implementation of practices presented in the *Land Development Provisions to Protect Georgia Water Quality* (GAEPD, 1997).

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. Georgia is working with local governments, and agricultural and forestry agencies, such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of best management practices to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality.

6.4 Public Participation

A thirty-day public notice was provided for this TMDL. During this time the availability of the TMDL was public noticed, a copy of the TMDL was provided as requested, and the public was invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

EPD has coordinated with EPA to prepare this Initial TMDL Implementation Plan for this TMDL. EPD has also established a plan and schedule for development of a more comprehensive implementation plan after this TMDL is established. EPD and EPA have executed a Memorandum of Understanding that documents the schedule for developing the more comprehensive plans. This Initial TMDL Implementation Plan includes a list of BMPs and provides for an initial implementation demonstration project to address one of the major sources of pollutants identified in this TMDL, while State and/or local agencies work with local stakeholders to develop a revised TMDL implementation plan. It also includes a process whereby EPD and/or Regional Development Centers (RDCs), or other EPD contractors (hereinafter, "EPD Contractors"), will develop expanded plans (hereinafter, "Revised TMDL Implementation Plans").

This Initial TMDL Implementation Plan, written by EPD and for which EPD and/or the EPD Contractor are responsible, contains the following elements.

1. EPA has identified a number of management strategies for the control of nonpoint sources of pollutants, representing some best management practices. The "Management Measure Selector Table" shown below identifies these management strategies by source category and pollutant. Nonpoint sources are the primary cause of excessive pollutant loading in most cases. Any wasteload allocations in this TMDL will be implemented in the form of water-quality based effluent limitations in NPDES permits issued under CWA Section 402. [See 40 C.F.R. § 122.44(d)(1)(vii)(B)]. NPDES permit discharges are a secondary source of excessive pollutant loading, where they are a factor, in most cases.

2. EPD and the EPD Contractor will select and implement one or more BMP demonstration projects for each River Basin. The purpose of the demonstration projects will be to evaluate by River Basin and pollutant parameter the site-specific effectiveness of one or more of the BMPs chosen. EPD intends that the BMP demonstration project be completed before the Revised TMDL Implementation Plan is issued. The BMP demonstration project will address the major pollutant categories of concern for the respective River Basin as identified in the TMDLs. The demonstration project need not be of a large scale, and may consist of one or more measures from the Table or equivalent BMP measures proposed by the EPD Contractor and approved by EPD. Other such measures may include those found in EPA's "Best Management Practices Handbook," the "NRCS National Handbook of Conservation Practices," or any similar reference, or measures that the volunteers, etc., devise that EPD approves. If for any reason the EPD Contractor does not complete the BMP demonstration project, EPD will take responsibility for doing so.

3. As part of the Initial TMDL Implementation Plan the EPD brochure entitled "Watershed Wisdom -- Georgia's TMDL Program" will be distributed by EPD to the EPD Contractor for use with appropriate stakeholders for this TMDL. Also, a copy of the video of that same title will be provided to the EPD Contractor for its use in making presentations to appropriate stakeholders on TMDL Implementation Plan development.

4. If for any reason the EPD Contractor does not complete one or more elements of a Revised TMDL Implementation Plan, EPD will be responsible for getting that (those) element(s) completed, either directly or through another contractor.

5. The deadline for development of a Revised TMDL Implementation Plan is the end of August 2004.

6. The EPD Contractor helping to develop the Revised TMDL Implementation Plan, in coordination with EPD, will work on the following tasks involved in converting the Initial TMDL Implementation Plan to a Revised TMDL Implementation Plan:

   A. Generally characterize the watershed;
   B. Identify stakeholders;
   C. Verify the present problem to the extent feasible and appropriate, (e.g., local monitoring);
   D. Identify probable sources of pollutant(s);
   E. For the purpose of assisting in the implementation of the load allocations of this TMDL, identify potential regulatory or voluntary actions to control pollutant(s) from the relevant nonpoint sources;
   F. Determine measurable milestones of progress;
   G. Develop monitoring plan, taking into account available resources, to measure effectiveness; and
   H. Complete and submit to EPD the Revised TMDL Implementation Plan.

7. The public will be provided an opportunity to participate in the development of the Revised TMDL Implementation Plan and to comment on it before it is finalized.

8. The Revised TMDL Implementation Plan will supersede this Initial TMDL Implementation Plan when the Revised TMDL Implementation Plan is approved by EPD.

Management Measure Selector Table

Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	*Metals (copper, lead, zinc, cadmium)*	PCBs, toxaphene
Agriculture	1. Sediment & Erosion Control	_	_		_	_				
	2. Confined Animal Facilities	_	_							
	3. Nutrient Management	_	_							
	4. Pesticide Management		_							
	5. Livestock Grazing	_	_		_	_				
	6. Irrigation		_		_	_				
Forestry	1. Preharvest Planning				_	_				
	2. Streamside Management Areas	_	_		_	_				
	3. Road Construction &Reconstruction		_		_	_				
	4. Road Management		_		_	_				
	5. Timber Harvesting		_		_	_				
	6. Site Preparation & Forest Regeneration		_		_	_				
	7. Fire Management	_	_	_	_	_				
	8. Revegetation of Disturbed Areas	_	_	_	_	_				
	9. Forest Chemical Management		_			_				
	10. Wetlands Forest Management	_	_	_		_		_		

Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	*Metals (copper, lead, zinc, cadmium)*	PCBs, toxaphene
Urban	1. New Development	–	–		–	–			–	
	2. Watershed Protection & Site Development	–	–		–	–		–	–	
	3. Construction Site Erosion and Sediment Control		–		–	–				
	4. Construction Site Chemical Control		–							
	5. Existing Developments	–	–		–	–			–	
	6. Residential and Commercial Pollution Prevention	–	–							
Onsite Wastewater	1. New Onsite Wastewater Disposal Systems	–	–							
	2. Operating Existing Onsite Wastewater Disposal Systems	–	–							
Roads, Highways and Bridges	1. Siting New Roads, Highways & Bridges	–	–		–	–			–	
	2. Construction Projects for Roads, Highways and Bridges		–		–	–				
	3. Construction Site Chemical Control for Roads, Highways and Bridges		–							
	4. Operation and Maintenance- Roads, Highways and Bridges	–	–			–			–	

REFERENCES

Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority, 2000. *Recommended Practices Manual, A Guideline for Maintenance and Service of Unpaved Roads*, February 2000.

GAEPD, 1997, *Land Development Provisions to Protect Georgia Water Quality*, Georgia Department of Natural Resources, Environmental Protection Division, October 1997.

GAEPD, 1998-1999, *Water Quality in Georgia,* 1998-1999, Georgia Department of Natural Resource, Environmental Protection Division.

GAEPD, 1998. *Chattahoochee River Basin Management Plan 1997,* Georgia Department of Natural Resource, Environmental Protection Division.

GAEPD, 1999. *Georgia's Best Management Practices for Forestry*, Georgia Department of Natural Resource, Georgia Forestry Commission, Georgia Forestry Association, June 1999.

GAEPD, 2000. *Georgia Nonpoint Source Management Program FFY 2000 Update*, Georgia Department of Natural Resource, Environmental Protection Division, Water Protection Branch, August 2000.

GAEPD, *Rules for Surface Mining, 391-3-3,* Georgia Department of Natural Resources, Environmental Protection Division.

GAEPD, *Rules and Regulations For Water Quality Control, Chapter 391-3-6,* July 2000, Georgia Department of Natural Resources, Environmental Protection Division.

GAEPD, *Rules for Erosion and Sedimentation Control, Chapter 391-3-7,* Revised June 2001, Georgia Department of Natural Resources, Environmental Protection Division.

GSWCC, 1994, *Agricultural Best Management Practices for Protecting Water Quality in Georgia*, September 1994.

GSWCC, 1997, *Field Manual for Erosion and Sediment Control in Georgia*, Georgia Soil and Water Conservation Commission, Athens, GA.

GAWDR, 2000, *Draft Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in the Piedmont Ecoregion of Georgia*, Revised June 9, 2000, Georgia Department of Natural Resources, Wildlife Resources Division, Fisheries Section.

GAWPB, 2000, *Draft Standard Operating Procedures Freshwater Macroinvertebrate Biological Assessment*, 2000, Georgia Department of Natural Resources, Water Protection Branch.

Thomas, Michael T., 1997. *Forest Statistics for Georgia.*

USDA-NCRS, 1997. *National Resources Inventory*; USDA-NCRS Athens, Georgia

USEPA. 1991. *Guidance for Water Quality –based Decisions: The TMDL Process.* U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-440/4-91-001, April 1991.

USEPA, 1998. *Better Assessment Science Integrating Point and Nonpoint Sources (BASIN*S), *Version 2.0 User's Manual,* U.S. Environmental Protection Agency, Office of Water, Washington DC

USEPA, 1999a*. 1999 Update of Ambient Water Quality Criteria*, U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA-822-R-99-014, December 1999.

USEPA, 1999b. *Protocol for Developing Sediment TMDLs*, First Edition, U.S. Environmental Protection Agency, Office of Water, Washington, DC

USEPA, 2000. *Watershed Characterization System - User's Manual*, US. Environmental Protection Agency, Region IV, Atlanta, Georgia, 2000.

USEPA, 2001a. *Watershed Characterization System (WCS), Georgia*, US. Tetra Tech, Environmental Protection Agency, Region IV, Atlanta, Georgia , Jan 31, 2001.

USEPA, 2001b. *Total Maximum Daily Load (TMDL) Development for Sediment in the Chattooga River Watershed*. April 2001.

APPENDIX A

Annual Average Sediment Load Summary Memorandum

SUMMARY MEMORANDUM
Annual Average Sediment Load
Anneewakee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Douglas

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Anneewakee Creek
Location: House Creek to Lake Monroe
Stream Length: 3 miles
Watershed Area: 16.39 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):

Douglasville Southside WPCP	148.4 tons/yr
Future Construction Sites	Meet requirements of General Storm Water Permit

Load Allocation (LA) : 4,824 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 5,121 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Black Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Stewart

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Black Creek
Location: Headwaters to Hannahatchee Creek
Stream Length: 6 miles
Watershed Area: 15.65 square miles
Tributary to: Hannahatchee Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 3,797 tons/yr
Land Use — 3,415 tons/yr
Road — 382 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 3,797 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Bustahatchee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Quitman

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Bustahatchee Creek
Location: Confluence with North Fork to Walter F. George Lake
Stream Length: 1 miles
Watershed Area: 8.24 square miles
Tributary to: Walter F. George Lake/Chattahoochee River
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 1,291 tons/yr
Land Use: 989 tons/yr
Road: 302 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,291 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Cavender Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Carroll

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Cavender Creek
Location: Carroll County
Stream Length: 2 miles
Watershed Area: 1.18 square miles
Tributary to: Whooping Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 454 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 454 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Coheelee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Early

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130004

Waterbody Name: Coheelee Creek
Location: Chancy Mill Creek to Chattahoochee River
Stream Length: 5 miles
Watershed Area: 21.28 square miles
Tributary to: Chattahoochee River
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 14,358 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 14,358 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Day Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Stewart**
Major River Basin:	**Chattahoochee**
8-Digit Hydrologic Unit Code(s):	**03130003**
Waterbody Name:	**Day Creek**
Location:	**Bluff Springs Branch to Hodchodkee Creek**
Stream Length:	**1 miles**
Watershed Area:	**16.43 square miles**
Tributary to:	**Hodchodkee Creek**
Ecoregion:	**Southeastern Plains**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**4,138 tons/yr**
Land Use	**3,614 tons/yr**
Road	**524 tons yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**4,138 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hilly Mill Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Heard/Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Hilly Mill Creek
Location: Heard/Coweta Counties
Stream Length: 6 miles
Watershed Area: 12.25 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development
Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 4,758 tons /yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 4,758 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hitchitee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Chattahoochee/Stewart

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Hitchitee Creek
Location: Cany Creek to Sand Branch
Stream Length: 5 miles
Watershed Area: 39.86 square miles
Tributary to: Chattahoochee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 5,172 tons/yr
Land Use — 4,722 tons/yr
Road — 450 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 5,172 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hodchodkee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Stewart

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Hodchodkee Creek
Location: SR 57 to Wimberly Mill Branch
Stream Length: 3 miles
Watershed Area: 14.38 square miles
Tributary to: Pataula Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Lumpkin WPCP 27.4 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 9,388 tons/yr
Land Use 8,907 tons/yr
Road 481 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 9,415 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hodchodkee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Stewart

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Hodchodkee Creek
Location: Day Creek to Foreman Mill Branch
Stream Length: 5 miles
Watershed Area: 62.87 square miles
Tributary to: Pataula Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Lumpkin WPCP 27.4 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 35,488 tons/yr
Land Use 33,343 tons/yr
Road 2,145 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 35,516 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hog Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Randolph/Clay

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130004

Waterbody Name: Hog Creek
Location: Headwaters to Cemochechobee Creek
Stream Length: 9 miles
Watershed Area: 15.01 square miles
Tributary to: Cemochechobee Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (not supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Randolph-Clay High School 1.4 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 5,547 tons/yr
Land Use 5,450 tons/yr
Road 97 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 5,548 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Hitchitee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Chattahoochee

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Little Hitchitee Creek
Location: Headwaters to Hitchitee Creek
Stream Length: 6 miles
Watershed Area: 7.63 square miles
Tributary to: Hitchitee Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 555 tons/yr
Land Use 499 tons/yr
Road 56 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 555 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Juniper Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Marion/Chattahoochee

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Little Juniper Creek
Location: Headwaters to Kings Mill Pond
Stream Length: 7 miles
Watershed Area: 9.11 square miles
Tributary to: Kings Mill Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 1,486 tons/yr
Land Use: 1,371 tons/yr
Road: 115 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,486 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Pine Knot Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Chattahoochee**
Major River Basin:	**Chattahoochee**
8-Digit Hydrologic Unit Code(s):	**03130003**
Waterbody Name:	**Little Pine Knot Creek**
Location:	**Headwaters to Pine Knot Creek**
Stream Length:	**4 miles**
Watershed Area:	**5.83 square miles**
Tributary to:	**Pine Knot Creek**
Ecoregion:	**Southeastern Plains**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:

All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:

Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**272 tons/yr**
Land Use	**232 tons/yr**
Road	**40 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**272 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Long Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Long Branch
Location: Coweta County
Stream Length: 4 miles
Watershed Area: 1.30 square miles
Tributary to: Caney Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 463 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 463 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Long Cane Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Troup

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Long Cane Creek
Location: Panther, Blue John and Long Cane Creeks downstream of LaGrange to Chattahoochee River
Stream Length: 14 miles
Watershed Area: 77.94 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA): 92.8 tons/yr
- Vulcan Construction Materials 90.7 tons/yr
- Milliken & Co. - Duncan Stewart 0.5 tons/yr
- Interstate Wastewater Services 1.6 tons/yr
- Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 31,361 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 31,454 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mineral Springs Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Mineral Springs Branch
Location: Newnan upstream from Bonnell
Stream Length: 1 miles
Watershed Area: 1.33 square miles
Tributary to: Mountain Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 469 tons/yr
Land Use — 108 tons/yr
Road — 361 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 469 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mineral Springs Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Mineral Springs Branch
Location: Newnan downstream from Bonnell
Stream Length: 3 miles
Watershed Area: 2.11 square miles
Tributary to: Mountain Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):

William L. Bonnell Co	54.9 tons/yr
Future Construction Sites	Meet requirements of General Storm Water Permit

Load Allocation (LA): 718 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 773 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mt. Hope Branch

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Meriwether**
Major River Basin:	**Chattahoochee**
8-Digit Hydrologic Unit Code(s):	**03130002**
Waterbody Name:	**Mt. Hope Branch**
Location:	**Meriwether County**
Stream Length:	**4 miles**
Watershed Area:	**1.10 square miles**
Tributary to:	**White Sulfur Creek**
Ecoregion:	**Piedmont**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**126 tons/yr**
Land Use	**122 tons/yr**
Road	**4 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**126 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Ollie Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Meriwether

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Ollie Creek
Location: Meriwether County
Stream Length: 1 miles
Watershed Area: 2.17 square miles
Tributary to: Bear Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 200 tons/yr
Land Use 192 tons/yr
Road 8 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 200 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Pataula Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Stewart

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Pataula Creek
Location: Headwaters to Clear Creek
Stream Length: 9 miles
Watershed Area: 8.13 square miles
Tributary to: Walter F. George Lake/Chattahoochee River
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 5,482 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 5,482 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Pine Knot Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Marion/Chattahoochee

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Pine Knot Creek
Location: Parkers Mill Creek to Little Pine Knot Creek
Stream Length: 6 miles
Watershed Area: 27.95 square miles
Tributary to: Upatoi Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 6,945 tons/yr
Land Use — 6,501 tons/yr
Road — 444 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 6,945 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Piney Woods Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Meriwether

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Piney Woods Creek
Location: Headwaters to Tom Keith Road
Stream Length: 2 miles
Watershed Area: 2.40 square miles
Tributary to: Bear Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 593 tons/yr
Land Use — 570 tons/yr
Road — 23 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 593 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Roaring Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Clay

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130004

Waterbody Name: Roaring Branch
Location: Headwaters to Chattahoochee River
Stream Length: 7 miles
Watershed Area: 8.16 square miles
Tributary to: Chattahoochee River
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 5,578 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 5,578 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Shoal Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Troup

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Shoal Creek
Location: Headwaters (Mountville) to 1-85/Ga Hwy 403
Stream Length: 3 miles
Watershed Area: 2.19 square miles
Tributary to: Beech Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 602 tons/yr
Land Use: 591 tons/yr
Road: 11 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 602 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Snake Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Snake Creek
Location: Coweta County
Stream Length: 4 miles
Watershed Area: 1.81 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 334 tons/yr
Land Use: 208 tons/yr
Road: 126 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 334 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tiger Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Muscogee

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Tiger Creek
Location: Headwaters to Upatoi Creek, Columbus
Stream Length: 5 miles
Watershed Area: 4.21 square miles
Tributary to: Upatoi Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 625 tons/yr
Land Use: 525 tons/yr
Road: 5.60 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 625 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Town Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Heard

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Town Creek
Location: Headwaters to Little Creek
Stream Length: 6 miles
Watershed Area: 3.26 square miles
Tributary to: Hillabahatchaee Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 1,345 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,345 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tributary to Flat Shoal Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Meriwether

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Tributary to Flat Shoal Creek
Location: Headwaters to Flat Shoal Creek
Stream Length: 2 miles
Watershed Area: 1.53 square miles
Tributary to: Flat Shoal Creek
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 590 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 590 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Wahoo Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Ollie Creek
Location: Upstream Arnco Mills Lake
Stream Length: 7 miles
Watershed Area: 20.58 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Newnan - Wahoo Creek WPCP 137.0 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 7,743 tons/yr
Land Use 6,906 tons/yr
Road 837 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 7,880 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Weaver Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Early

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130004

Waterbody Name: Weaver Creek
Location: Headwaters to Sawhatchee Creek
Stream Length: 5 miles
Watershed Area: 4.75 square miles
Tributary to: Sawhatchee Creek
Ecoregion: Southeastern Plains

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA): 2,801 tons/yr
Land Use: 2,687 tons/yr
Road: 114 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 2,801 tons/yr